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ANCIENT INDIA

Bulletin of the Archaeological Survey of India

NUMBER 12

1956

CONTENTS

EDITED AND PUBLISHED BY THE DIRECTOR GENERAL OF ARCHAEOLOGY IN INDIA, NEW DELHI

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ERRATUM

ANCIENT INDIA NUMBER 9

Page 62. As references to paragraphs 1 and 3, add : Dharani Sen, 'Lower palaeolithic culture-complex and chronology in India', Presidential Address, Section of Anthropology and Archaeology, Fortyfirst Indian Science Congress, Hyderabad, 1954.

The omission was due to a regrettable editorial oversight.

ANCIENT INDIA

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NOTES

THE discovery of the Painted Grey Ware and its importance in the proto-historic archaeology of north India were fully discussed in the last issue of *Ancient India*. Here, we may consider the salient aspects of another culture which has attained prominence in recent years. The elements of this culture, chalcolithic in character, were detected as early as 1942 at Brahmagiri in north Mysore: the 1947-excavation at the same site placed it on a confirmed basis. Since then, the efforts of field-workers have resulted in the location of many of its centres in central India and the Deccan: between 1950 and this year, chalcolithic levels have been excavated by the Deccan College Post-graduate and Research Institute at Nasik on the Godavari, at Jorwe on the Pravara, a tributary of that river, at Maheswar and Navda Toli on the Narmada and at Nevasa, again on the Pravara; by the University of Saugar at Tripurī in the Narmada valley; and by the Department of Archaeology at Bahal on the Girna, a feeder of the Tapti, at Maski in the Krishna-Tungabhadra basin, at Prakash on the Tapti and at Nagda on the Chambal. Surface-exploration has brought to light many other sites, all comprised in the stretch of land between Nagda on the north and Brahmagiri on the south—roughly extending from the Tropic of Cancer to 15° N. Latitude, a distance of about 600 miles. The fact that the culture transcended the respective limits of the latter-day Aryan and Dravidian language-zones may not be without import.

Excavators have proposed 1000 B.C. as the date of the introduction of this culture: the possibility of a slightly earlier beginning is, however, not entirely ruled out. At Brahmagiri and Maski the culture gave way to the megalithic folk and at all the other places to the users of the Northern Black Polished Ware.

* * * * * *

Side by side, the proved existence of the Harappa culture in the western peninsula introduces a new factor in Indian archaeology. And what is more important is that in this region the culture does not seem to have met with an abrupt end as in the north-west, for the succeeding cultures derive elements from it. The post-Harappan stage of western India, the chalcolithic phase of the heart of India and the Painted Grey Ware epoch of north India could not have been far removed from each other in point of time. Thus, there is need for a thorough exploration of the triangular stretch of land formed by Rangpur in Kathiawad, where there is no break in occupation after the Harappa culture,

Nagda, a northern outpost of the chalcolithic culture, and Jaipur, near which is the south-western point of the Painted Grey Ware culture, for bringing to light evidences of their possible mutual contacts. It is becoming increasingly manifest that many a stream met and fed the river of Indian civilization at the time of its formation in the early centuries of the first millennium before Christ.

* * * * * *

To turn to the chalcolithic culture again. Nothing in the preceding paragraphs should be taken to indicate that its homogeneity has been definitely established at all the places where it has been identified: on the contrary, local variations are fairly well-marked. For example, the long blades of Brahmagiri and Maski and the vases with long spouts or 'drinking tubes' of the Godavari sites seem to occur only at these respective places. The pottery of Brahmagiri is said to be hand-made, whereas at all other places it is definitely wheel-turned. Grey pottery may exist at all the sites, but there seems to be a wide divergence in its relative proportion. To offset these and other differentiae may be emphasized the broad uniformity in the equipments of the culture, viz. the use of painted pottery, microliths and, to a restricted degree, copper and the typological similarity of the polished stone axes of Brahmagiri and Nevasa.

Another feature of the culture is its general association with the Black Cotton Soil. Except at Brahmagiri, where the Soil is not encountered for the simple reason that the place is situated outside the zone of the Soil, and at Prakash, which is well within its zone but where the reason for its absence in the excavated area can only be a matter of speculation, the Soil is present at all the centres. At Nasik, Jorwe, Tripurī, Bahal and Nevasa, the respective excavators are definite that the relics of the culture were embedded well within the Soil; at other places they are not certain about the intermingling of the geological and archaeological deposits. The question requires further examination.

No evidence is as yet forthcoming about the authorship of the culture. We do not even know whether it evolved on the Indian soil or whether we have to look beyond the frontiers of India for its genesis. The scanty skeletal remains are not sufficient to infuse 'life' into the archaeological material. A comparison has, however, been drawn between a few painted pottery-designs with Iranian ones of more or less comparable dates. On the other hand, at Prakash the culture is represented by two phases, the later of them probably more akin to the Nasik-Jorwe-Nevasa group. This may, with further evidence, turn out to be significant for the question of origins.

* * * * * *

What bearing this culture might have had on the ethnological and linguistic history of the country may be examined by competent workers. One of the recent attempts at the equation of archaeological and ethnological data, viz. the ascription of the megalithic monuments of south India to the ethno-linguistic group known as Dravidian, does not seem to have been as yet examined by any competent philologist from his point of view; we have not yet been told how it reacts on such theories as 'there is ample evidence, linguistic or otherwise, to show that at one time they (i.e. the Dravidians) extended from Baluchistan to Bengal' or 'the Dravidians were able to make their language and culture paramount throughout the whole of central India and India to the south of the Vindhya mountains many centuries before Christ'.

If these and such other statements are based on unassailable linguistic data, and if the identification of the megalith-builders of south India with the Dravidians is equally correct, we are faced with the fact of the non-existence of typical megaliths, in any significant numbers, in the regions which the Dravidians are supposed to have inhabited in the past. Furthermore, we have to account for a chronological hiatus, for, on archaeological grounds, it may be difficult to push back the date of the megaliths to such an extent as would meet the linguistic requirements. We have also to explain how the iron-using megalithic Dravidians could have inhabited the heart of India in practically the same period as the stone-copper-using people whose remains the archaeologist is now finding in the same region. The evidences collected from different angles and the theories built thereon do not seem to harmonize with one another.

On the other hand, the far-flung culture briefly described above may be considered with the hypothesis of the one-time extent of the Dravidian culture, with a view to a possible equation. This, again, is not free from difficulties: the Brahmagiri-Maski evidence has shown that the chalcolithic folk (i.e. the Dravidians if the equation is accepted) were supplanted by the authors of the megaliths; in other words, we are led to encounter the position that the Dravidian culture was overwhelmed in south India by a vigorous external force which made the land its own, and yet the former culture reigned supreme there. Further, has not the ethnologist declared that the skulls of the people interred in the Adichanallur graves—a product of the complex megalithic burial-customs—are identical with those of the present-day Dravidians?

The foregoing is only intended to show the overriding necessity of collaboration among workers engaged in reconstructing India's past from their specialized standpoints, for without that we are liable to strike against blind alleys. It is admitted that race, language and archaeological culture need not necessarily go hand in hand, so that it may not always be fruitful to seek their interrelationship. Nevertheless, a discovery in any one of these fields should be examined for its possible implications on other fields. Otherwise, each science is apt to produce from its own angle of vision a history of India which may be far removed from what actually happened in the past.

A. Ghosh

THE MICROLITHIC SITES OF TINNEVELLY DISTRICT, MADRAS STATE[1]

By FREDERICK E. ZEUNER and BRIDGET ALLCHIN

CONTENTS

OF the numerous microlithic sites of India the vast majority are of a late age, ranging well into the Iron Age and possibly the historic period. In view of the lack of true Upper Palaeolithic industries in the European sense in India, it is important to investigate with care all those microlithic sites which suggest at least some geological antiquity. Among these the sites found associated with fossil and Recent red dune-sands called *ṭeris*, situated in Tinnevelly District of the southern part of Madras State, are of considerable interest both because of their stratigraphical and topographical contents and because of their typology. The present paper reports on observations made in the field, assesses their possible significance and discusses the typology of the industries.

The main group of Late Stone Age sites lies near the coast in Tuticorin and Tiruchendur Taluks in Tinnevelly District. They are known as Ṭeri sites on account of their close association with the large *ṭeris* or sand-dunes of the region. Today the inhabitants draw their livelihood principally from fishing, salt-panning and agriculture

[1] Fifth report on the Indian Geochronological Expedition, 1949. Previous reports:
(i) *Stone Age and Pleistocene Chronology in Gujarat*, Deccan College Monograph Series, 6 (Poona, 1950).
(ii) *Prehistory in India*, Deccan College Handbook Series, 1 (Poona, 1951).
(iii) 'The microlithic industry of Langhnaj, Gujarat', *Man*, 1952, no. 182.
(iv) 'Das Problem der Pluvialzeiten', *Geol. Rundschau*, 41 (1953), pp. 242-53.

based on tank-irrigation. The coastal plains with their extensive tank-irrigation and rice-cultivation carry a very dense population and were the home of the Tamil civilization of early historic times. The hinterland is formed by the foot-hills of the Ghats and the Mysore plateau. It has generally a lower rainfall, is less densely populated, is essentially a millet-producing area and often forms or has formed a refuge-area for primitive tribes.

It is unfortunate that with the exception of a small collection from Pondicherry the material from Tinnevelly District discussed here is all that is available from the coastal plain. The finds from the inland areas of Mysore are being described by Seshadri.[1]

1. THE SITES (fig. 1)

Tuticorin and Tiruchendur lie north and south of the Tambraparni river. Apart from a few places such as central Tiruchendur, where marine sandstone rocks of early Pleistocene or Tertiary Age appear, the areas north and south of the river-mouth are made up of late Pleistocene, possibly early Holocene, formations. All sites are situated some distance inland, but in order to understand their geological context, the Recent coastal formations had to be studied. This was done at Tuticorin and on Pandyan Tivou island.

The coast of Tuticorin[2] provides an example of what is happening today: an outer bar is being formed at a distance of about 2 miles from the main coast-line. It consists chiefly of coral sand and coarse fragments of marine organisms. South of Tuticorin Bay the lagoon between the bar and the coast-line has been filled in completely, and wind is already playing its part by forming dunes on the lagoon-filling. Similarly, considerable dune-formations exist on the main coast-line north of Tuticorin, where they appear to be superimposed on the next higher level of 20 ft. One thus finds that dunes are being blown on to older land.

Immediately west of Tuticorin, i.e. on the landward side, at Milavittan, sand-pits near the Tuticorin Spinning Mills show sub-recent calcareous sands which are probably of estuarine origin, as they are close to the mouth of the river, south of Tuticorin. They consist of 5 ft. of evenly- and horizontally-bedded slightly yellowish quartz-sand, very slightly weathered to a depth of 2½ ft. Below, a calcareous sand occurs which is almost entirely of organic origin. It contains some quartz-grit and bands of lime-concretions, the latter being the result of eluviation of the soil above. The two beds together appear to represent a fossil-beach overlain by coastal dune-sand. Though not entirely recent (weathering having taken place since their formation), they are geologically very young, since the soils on them are immature, not having reached the stage of formation of a cemented red B-horizon.

As one goes inland, several morphological steps are observed, which appear to represent successive lagoon-floors of a greater age. The steps are often marked by lines of tanks constructed on the bluff between two levels. The first group of tanks passes about 2½ miles west of Tuticorin. Immediately behind it dune-sands occur, which are covered with forest and show a mature soil-profile with about 2 ft. of a bleached A-horizon and about 5 ft. of red cemented B-horizon (site at mile 26 on Tuticorin-Palamatta road.)

[1] M. Seshadri, *The Stone-using Cultures of Prehistoric and Proto-historic Mysore* (in the press).

[2] It is an off-shore bar coast as described by Zeuner, 'Pleistocene shore-lines', *Geol. Rundschau*, 40, 1 (1952), pp. 39-50.

No implements were found at this point, but the soil-profile remains the same further inland, except that in many places the A-horizon has been blown away, following deforestation and leaving the surface of the B-horizon exposed. Any implements that may have been incorporated in the A-horizon part of the profile or were lying on the original land-surface would thus have sunk down onto the surface of the B-horizon. This process of concentration must have greatly enriched the *ṭeri*-surface sites.

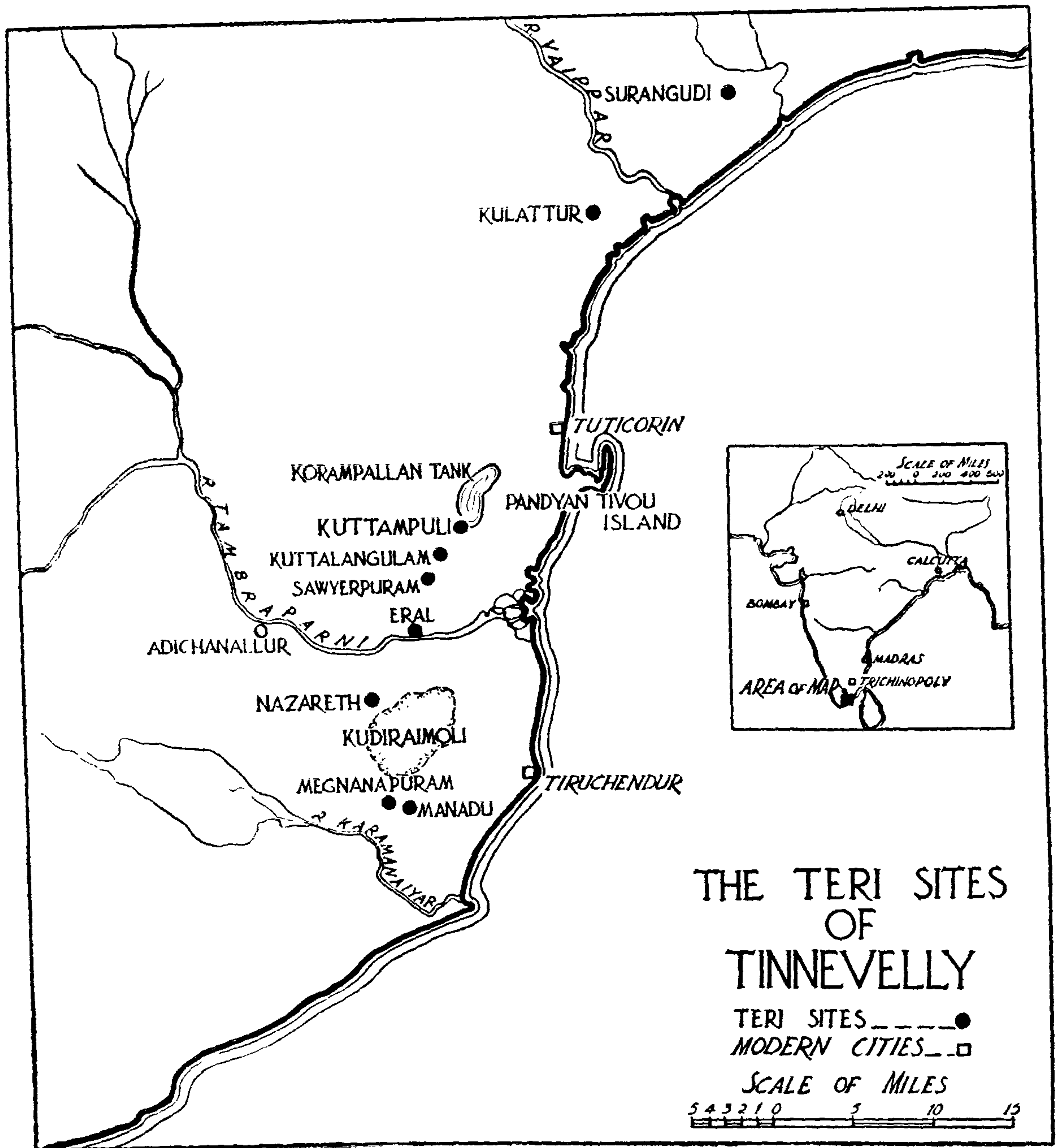


Fig. 1

The section at milestone 26 lies on the 20-ft. level. The next higher level is 50 ft. above the sea and is marked by a line of tanks extending from Kuttampuli to Eral on the Tambraparni river. North of Tuticorin, however, the Korampallam tank appears to continue this line, although it is conceivable that it belongs to the step from the 20 ft. level down to the recent one. Inland from this line of tanks the land lies at 50 to 100 ft. with many dunes (*ṭeris*) superimposed and attaining sometimes to 200 ft. above sea-level. These dunes consist of reddened sand and are in all probability originally fossil-dunes, revived by deforestation and added to by A-horizon material from the soil-sections of the type described.

Round the *ṭeris* north of Sawyerpuram three microlithic sites are situated: Kuttampuli and Sawyerpuram on the south and Kuttalangulam on the west. The implements are heavily stained with red hydrated ferric oxide, which implies that they come from within the weathered sand of the original soil-sections. They are, therefore, likely to be older than the *ṭeri*-accumulation, though perhaps not much so, and certainly older than the red weathering. This is confirmed by a site south-west of Subrahmanyapuram, where the B-horizon has been cut into by erosion and where both cores and flakes are found in the iron-cemented sand.

This observation was correctly made by Foote who, in describing the Sawyerpuram site, states that 'imbedded in the red loam were fragments of chert, silicified wood and limpid quartz, all three stones foreign to that part of the country.'[1] In Foote's day, however, a pedological interpretation of the sections was not possible.

The pedological view-point enters into the description of the same site by Aiyappan.[2] He regarded the weathering as lateritic, which, upon re-examination, has proved to be mistaken, as silica is preserved in it. The soil of the *ṭeri*-area, though as red as any laterite, belongs to the *rotlehm* group of Kubiena,[3] and, in the surface-sections containing the artefacts, it is immature. Its peculiarities may eventually require a special name, but this is not relevant here.

What is relevant is that, following the formation of dune-sand and lagoons, weathering occurred, and this was followed by a second phase of wind-activity. The latter may be equated with the recent or sub-recent phase, which is also represented by the modern lagoon. Between it and the earlier lagoon-phase, therefore, the weathering intervened, and it corresponds thus to a drop of the sea-level from 20 ft. to zero, or even to a negative oscillation, and the prehistoric sites would belong to a phase when the sea-level stood about 20 to 30 ft. higher than today. The original *ṭeri*-sands, i.e. not the secondary dunes that are mobile at the present day, would therefore be comparable with the recent sand-accumulations north of Tuticorin. The important conclusion thus arrived at is that these microlithic sites are older than a phase of ancient weathering and are associated with a sea-level somewhat higher than at present.

It would be rash to fit this phase into the scheme of relative climatic chronology. Assuming that no earth-movements have interfered, three possible correlations are available for a sea-level of 20 to 30 ft. It could be Late Monastirian, Epimonastirian, or Postglacial.[4] The first alternative would place it in the Last Interglacial. It is the least

[1] R. B. Foote, *The Foote Collection of Indian Prehistoric and Protohistoric Antiquities, Notes on their Ages and Distribution* (Madras, 1916), p. 50; also *Catalogue Raisonné* (Madras, 1914), pp. 1-3.

[2] A. Aiyappan, 'Mesolithic artifacts from Sawyerpuram in Tinnevelly District, S. India', *Spolia Zeylania*, XXIV, pt. 2 (1945), pp. 145-54.

[3] W. L. Kubiena, *The Soils of Europe* (London, 1953).

[4] F. E. Zeuner, 'The three "Monastirian" sea-levels', *Act. Congr. Int. Quatern.*, 4 (Rome, 1955).

likely, because of the immature condition of the observed soils. The second would place it in the first interstadial of the Last Glaciation of the north temperate zone, still in the Upper Pleistocene. This is conceivable but cannot be decided without further geological investigation. The third alternative is at the present the most likely as it would raise no typological difficulties. It would correlate the phase with the post-glacial climatic optimum of Europe. This has been variously dated,[1] but its maximum eustatic effect is likely to have occurred in Late Atlantic times, about 4000 B.C. This date is here tentatively suggested for the Ṭeri industries, with the proviso that further geological research may push them back into the Pleistocene. In view of the scarcity of datable microlithic sites, not only in India but elsewhere, the Ṭeri sites must be regarded as important.

Returning now to the description of the geological and topographical set-up of the area, it is possible that there is an even higher land-surface at approximately 100 ft. above sea-level, which, however, cannot be clearly separated from another 50-ft. level. South of the Tambraparni river, the beach-levels lie somewhat further east, which appears to be due to the presence of older rocks at Tiruchendur.

South of Tiruchendur the coast-line turns south-west. The sequence of levels, however, appears to be the same as that north of the Tambraparni. Important sites occur near Megnanapuram, north of which lies the Kudiraimoli *ṭeri*. At Megnanapuram, on the 50-ft. land-surface, the A-horizon has been denuded and the B-horizon not only exposed but even cut into and destroyed over parts of the area. Here, many sections are available in the B-horizon, in which flakes were found. The industry of Megnanapuram differs from the others in the lack of geometric forms, and it is possible that it is older than the other industries, being associated with the sands of which the 50-ft. land-surface is composed. Only 1½ miles east is Manadu, a site with a nondescript flake-industry, which includes a single-trimmed point of a type which occurs at Sawyerpuram. This is a somewhat doubtful specimen (fig. 5, *6*) but, if accepted, may be taken to suggest that the Manadu industry at least belongs to the same group as those of the Sawyerpuram neighbourhood.

We will now examine the Tinnevelly sites individually and classify the material found there on the basis mainly of the collection which Dr. B. Subba Rao brought on loan to the Institute of Archaeology, University of London, in 1954. The writers are, however, under the impression that this collection did not include everything and that a more complete set might have given to the industry a slightly more Upper Palaeolithic aspect. The material here recorded is, on the whole, typically microlithic, with geometric elements.

2. THE INDUSTRIES

A. Megnanapuram (58H/15, C1)[2]

It is a hamlet lying half a mile south-west of the Kudiraimoli *ṭeri*. The site lies on the 50-ft. beach-level. This fact, together with certain typological differences between the material from Megnanapuram and that from other sites in the neighbourhood, may be taken as indicating an antiquity greater than that of the Sawyerpuram group. The

[1] F. E. Zeuner, *Dating the Past*, 3rd ed. (London, 1952).

[2] This and such subsequent references are to the 1 in. = 1 mile topographical map-sheets of the Survey of India.

differences consist of the absence of blades of geometric forms and points of all kinds. On the other hand, the similarity of the discoids and chopping tools found at this site and others in the neighbourhood might be taken as a link between them. However, this may alternatively be accounted for by the long duration of local tradition in matters of technique, which is known from many parts of the world. All the material is as deeply stained with hydrated ferric oxide as that from the majority of the other sites. The following tools are found in the collection:—

HAMMER-STONE (one), an almost cylindrical quartz pebble battered at both ends.

FLAKES AND PIECES (one hundred and fiftyfive), many showing signs of considerable use.

DISCOIDS (nine), bifacial and unifacial types varying greatly in size. (Fig. 5, *2-4*.)

CHOPPING TOOL (one). (Fig. 5, *5*.)

CONCAVE SCRAPER (one), on a flake.

SIMPLE POINT (one), very crude. (Fig. 5, *1*.)

All sites that follow, except Pondicherry, appear to belong to one phase, the Ṭeri industry proper, with Sawyerpuram as its type-site.

B. KUTTAMPULI (58L/2, A1)

This and the two following sites are situated round a *ṭeri* lying immediately north of the Tambraparni river. Owing to deforestation the orange sand, which formed the A-horizon of the old soil-profile, is being blown away. The removal of the sand leaves a residual pavement or hardpan, formed by the old B-horizon. Stone tools and potsherds occur on the surface, but the nature of their association is uncertain. The potsherds are of the Black-and-red Ware closely similar to sherds from the urn-burials at Adichanallur, assignable to the centuries round about the beginning of the Christian epoch. As it is highly unlikely in view of observations made in the field that the stone industry is as late as this, it seems probable that the association is purely accidental. All specimens consist of quartz and various coloured cherts. They are stained deep orange-brown, not quite so heavily perhaps as those from Sawyerpuram, but to a comparable degree. The tools may be classified as follows:—

BLADE-FLAKES, FLAKES AND FRAGMENTS (one hundred and seventyfour), many of which are considerably used but none retouched. The majority have unprepared striking platforms, forming a wide angle with the flake-surface. The angle varies, however, to include a few with a right angle and a still smaller number showing preparation of the striking platform. (Fig. 2, *24*.)

BLADES (twelve), all used, and five broken.

BACKED BLADES (four), all broken.

HOLLOW SCRAPER (one), apparently having had one end snapped off after being fairly heavily used. (Fig. 2, *23*.)

DISCOIDS (twentyone), varying greatly in size and thickness. There are both bifacial and unifacial examples, and the thinner ones of both types show evidence of heavy use and possibly occasional retouch along the straightest and sharpest edge. (Fig. 2, *25*.)

CHOPPING TOOLS (three), grading into the largest bifacial discoids. The main difference between the two groups is that those called chopping tools fit conveniently into the hand, but the discoids do not, suggesting that the latter might have been hafted. (Fig. 2, *26*.)

UNCLASSIFIED EDGE-TOOLS (two), small flakes with pressure-flaking on the upper surface from one edge, closely resembling those from Kuthankuli (fig. 2, *12*).

LUNATES (six), of varying sizes. One appears to have a serrated edge, possibly deliberate (fig. 2, *21*). Four are made on blades and two on flakes.

TRANSVERSE ARROW-HEADS (five), one (fig. 2, *19*) having been made on a blade-flake, snapped off at one end and retouched at the other, in a manner similar to many specimens from Ceylon. Of the remaining four, two are made on blades and the other two on flakes. Two show considerable use-marks or 'nibbling' along the sharp edge. (Fig. 2, *20*.)

SIMPLE POINTS (four), three of quartz and one of chert. Rather crude and possibly fortuitous.

ASYMMETRICAL POINTS (two). (Fig. 2, *17* and *22*.)

UNIFACIAL POINT (one), made of quartz and pressure-flaked all round the upper surface only. The centre of the upper surface, however, remains rough, and the striking platform is unprepared. (Fig. 2, *18*.)

BLADE-CORES (four), all rather coarse and allowing for the removal only of very short blades.

C. KUTHANKULI

This site does not appear on the Survey of India maps of Tinnevelly District, and it seems possible that the name is simply a different spelling of Kuttampuli and that two separate collections were made from the same site by different persons. The raw material is quartz and chert as at Kuttampuli, with a higher proportion of quartz among the waste material and a higher proportion of chert among the finished specimens. All the material is stained in a colour similar to that from Kuttampuli. The tools may be classified as follows:—

FLAKES AND FRAGMENTS (four hundred and seventyone). Among the flakes the angle of the striking platform to the flake-surface varies greatly. A very few specimens have right-angle prepared striking platforms and are struck from prepared cores. (Fig. 2, *14*.) But these are few in number.

HORSE-HOOF SCRAPER (one). (Fig. 2, *13*.)

DISCOIDS (eight), bifacial and unifacial specimens of various sizes. (Fig. 2, *16*.)

UNCLASSIFIED EDGE-TOOLS (two), one with pressure-flaking all round from both sides, leaving a small unflaked area in the middle of each face, and the other pressure-flaked from one side only along two edges. (Fig. 2, *11* and *12*.)

LUNATES (fourteen), of varying sizes, eight made on flakes and six on blades. (Fig. 2, *8*, *9* and *15*.) They grade into the transverse arrow-heads.

TRANSVERSE ARROW-HEADS (five), two made on flakes and three on blades. (Fig. 2, *10*.)

SIMPLE POINTS (seven), of varying shapes and sizes, struck to form points but unretouched. (Fig. 2, *1* and *5*.)

SINGLE-TRIMMED POINTS (six), all leaf-shaped and tending to be rather thick in section. (Fig. 2, *2* and *3*.)

ASYMMETRICAL POINTS (four). (Fig. 2, *4.*)

DOUBLE-TRIMMED POINTS (seven), all somewhat irregular and several broken.

BIFACIAL POINTS (two), both giving the impression of being small leaf-shaped points which have had part of the base broken off diagonally and the broken edge then coarsely retouched. Similar specimens occur at other sites in Tinnevelly and also in Ceylon collections alongside more regularly-shaped bifacial points. One must infer either that they were deliberately made in this way or that bifacial points regularly broke in this way in use and were possibly re-used for some other purpose. (Fig. 2, *6* and *7.*)

If the collections from 'Kuttampuli' and 'Kuthankuli' were made from the same site, they illustrate the differing tastes of the collectors. On the grounds of technique and *état physique*, however, there is no reason why they should not come from the same site.

D. SAWYERPURAM (SAYAPURAM) (58L/2, A1)

This site is historically the most important, for it was first described by Foote[1] and subsequently by Aiyappan.[2] Foote already noticed that artefacts occur *in* the 'red loam' as he called it. He also mentions a sherd, but this lay on the surface as it had suffered from wind-polish. The site was revisited by one of the writers, and artefacts were again recovered from the cemented B-horizon, found to be similar to those of Kuttampuli. The raw material, which consists of quartz and chert in more or less equal quantities, is, if anything, slightly more heavily stained than that from Kuttampuli. The tools may be classified as follows:—

HAMMER-STONE (one), a quartz pebble battered at both ends.

FLAKES, BLADE-FLAKES AND FRAGMENTS (two hundred and ninetyfive), many used and some with possible retouch. The flakes vary greatly in shape and size, a small number having a right-angle striking platform and an occasional specimen a prepared striking platform. (Fig. 3, *10* and *11.*)

BLADES (six), short and thick, used but not retouched.

BACKED BLADES (nine), three complete and six broken. One of the latter has an irregular retouch along both edges, and four are small sections of fine blades with a steep regular retouch along one edge. The remaining four, including the three complete specimens, are thick blades with steep retouch and battering along one edge. (Fig. 3, *7.*)

DISCOIDS (eight), of varying shapes and sizes. (Fig. 3, *13.*)

LUNATES (four), of varying shapes and sizes. (Fig. 3, *3*, *4*, *8* and *9.*)

TRANSVERSE ARROW-HEADS (three), two with retouch along one edge only, as in Ceylon. (Fig. 3, *5* and *6.*)

ASYMMETRICAL POINT (one), tip broken. (Fig. 3, *2.*)

BIFACIAL ALMOND-SHAPED POINT (one), pressure-flaked on both sides, along both margins, but not along the butt, which is unworked. It has an unprepared striking platform, making a wide angle with the flake-surface. (Fig. 3, *1.*)

MICROBURIN (one). (Fig. 3, *12.*)

[1] Foote, *op. cit.* (1916), p. 50.
[2] Aiyappan, *op. cit.*

E. Kattalankulam

No place of this name appears on any of the Survey of India maps, but one village-name, Kuttalangulam (58L/2, A1), appears to be a different spelling of the same name. No description of the site is available, but as it is close to Sawyerpuram and Kuttampuli, and as the material is stained to a degree similar to that from those sites, it is probably derived from a similar deposit. The raw material is quartz and chert. The tools may be classified as follows:—

Flakes and pieces (one hundred and nine), many used.

Retouched flakes (eleven), none with any definite form.

Blades (twenty), many used and many broken.

Discoids (twelve), nine bifacial and three unifacial. (Fig. 4, *26* and *27.*)

Lunates (four). (Fig. 4, *28.*)

Simple points (eight), triangular in form. (Fig. 4, *24.*)

Single-trimmed point (one), made of quartz and very crude. (Fig. 4, *22.*)

Double-trimmed point (one), broken. (Fig. 4, *23.*)

Asymmetrical points (two). (Fig. 4, *25* and *29.*)

Blade-cores (seven), having had short, thick blades removed and being very irregular.

F. Kulattur

No geological information is available regarding this site, and it is not marked on the Survey maps.

The raw material of the implements is chert, quartz and rock-crystal, with chert predominating among the finished tools. Some specimens are slightly stained yellowish brown or have brown dust adhering to them, but none are deeply stained like those from Sawyerpuram. The tools may be classified as follows:—

Flakes and fragments (approximately two hundred), many used and almost all of quartz.

Blades (ten), seven complete and three broken. (Fig. 4, *17.*)

Backed blades (eleven), all short and thick. (Fig. 4, *6.*)

Obliquely truncated blades (two). No comment.

Side-scrapers (four), all on flakes.

Concave scraper (one), a notched flake. (Fig. 4, *21.*)

Discoids (fifteen), of varying sizes, bifacial and unifacial. (Fig. 4, *16* and *18.*)

Worn tula flakes (two). (Fig. 4, *19* and *20.*)

Lunates (fortynine), with great variations of size and shape and merging into triangles, asymmetrical points and transverse arrow-heads. (Fig. 4, *9*, *10* and *11.*)

Triangles (four). (Fig. 4, *12.*)

Transverse arrow-heads (fourteen). (Fig. 4, *13* and *14.*)

Simple points (ten), triangular and leaf-shaped and varying between these two forms. (Fig. 4, *1* and *2.*)

SINGLE-TRIMMED POINTS (sixteen), including many variant shapes. (Fig. 4, *3*, *4*, and *5*.)

ASYMMETRICAL POINTS (fifteen), including many variant shapes. (Fig. 4, *7* and *8*.)

AWL (one). (Fig. 4, *15*.)

BLADE-CORES (two), semi-cylindrical and very coarse.

Further information about this site would be of great value, as the tools clearly belong to the same industrial tradition as those of the Teri sites, while being almost completely without the usual red stain. This suggests that they either come from a different type of site and belong to the surface rather than the B-horizon, or else they have been exposed long enough for an original film of hydrated iron oxide to be removed by solution. The first alternative appears more likely. The absence of bifacial points from this collection is not necessarily an important factor, as their numbers are always small, amounting to only one or two specimens in collections twice the size of this one.

G. PUTTAN TARUVAI (58H/15, C2)

This site was not visited and no information is available about it except that which can be gained from the map, viz. that it lies at the foot of a *teri*, on the inland side. The tools are heavily stained with red hydrated ferric oxide, as at Sawyerpuram, which indicates a similar type of site. The raw material is chert and quartzite as before. The stone implements are accompanied by shells, animal teeth and bones, pottery and lumps of *kankar* which were also found on the site. The pottery, although much weathered and quite fragmentary, is recognizable as the Black-and-red Ware similar to that at Kuttampuli (above, p. 9). However, the pottery is not stained like the stone tools, which indicates that it was deposited on the surface and never incorporated in the soil. The shells and teeth are somewhat stained, but the nature of their association with the stone industry is uncertain, as there is no information as to how they were found. The following classification can be made of the stone tools:—

FLAKES AND FRAGMENTS (approximately five hundred), many having clearly been used and the majority being of quartz.

BLADES (four), all broken.

BACKED BLADES (two), both broken.

OBLIQUELY TRUNCATED BLADES (three). No comment.

SIDE-SCRAPERS (five), on thick flakes.

END-SCRAPER (one). (Fig. 3, *20*.)

THUMB-NAIL SCRAPER (one). (Fig. 3, *21*.)

DISCOIDS (six), unifacial and bifacial. (Fig. 3, *23*.)

CHOPPING TOOL (one), made on a small pebble. (Fig. 3, *24*.)

LUNATES (three), all rather coarse. (Fig. 3, *19*.)

TRANSVERSE ARROW-HEADS (two). (Fig. 3, *22*.)

SIMPLE POINTS (six), five triangular and one leaf-shaped. (Fig. 3, *14* and *15*.)

SINGLE-TRIMMED POINTS (two), both leaf-shaped. (Fig. 3, *16* and *17*.)

ASYMMETRICAL POINT (one). No comment.

BIFACIAL POINT (one), pressure-flaked along both margins, part of the base apparently broken off diagonally and the broken edge coarsely retouched, similar to those from Kuthankuli. (Fig. 3, *18*.)

H. SURANGUDI

This site does not appear on the Survey maps of the area, but the raw material and *état physique* and tool-types are closely similar to those of the collections from the Sawyerpuram sites.

The material is all heavily stained with red hydrated ferric oxide and consists of quartz with a few pieces of chert and quartzite. The collection may be classified as follows:—

BLADE-FLAKES, FLAKES AND FRAGMENTS (ninetyfive), some showing signs of use.

BACKED BLADE (one), thick in section and battered on the retouched edge.

DISCOIDS (three), one bifacial and two unifacial.

LUNATE (one), large and well-made.

BLADE-CORE (one), small.

I. NAZARETH (58H/14, C3)

The site is located on the inland side of the Kudiraimoli *ṭeri*, at the north-east corner of the *ṭeri* which lies south of the Tambraparni river. All the material is stained yellowish brown. On the evidence of this collection alone it is doubtful whether any of the specimens may be regarded with certainty as the result of human labour. The label accompanying the collection reads '3 almond-shaped points', and these, if they were present, would endorse the rest of the collection. In their absence the remainder of the specimens may be classified as follows:—

FLAKES AND FRAGMENTS (thirtyseven), some with possible use-marks.

SEMI-CYLINDRICAL BLADE-CORE (one). No comment.

ALMOND-SHAPED POINTS (three), not available for study.

J. MANADU (55L/3, A1)

This is the name of a hamlet about 1 mile south-east of the Kudiraimoli *ṭeri*, about a mile from Megnanapuram and the Sawyerpuram sites.

With two exceptions there are no definite tool-types, but a number of the flakes collected has a sufficiently acute angle between the striking platform and the flake-surface to suggest that they were struck by man (fig. 5, *8*). In addition, some bear what appear to be use-marks. The exceptions are a single-trimmed point (fig. 5, *6*) with signs of heavy use in addition to the retouch and a small core from which flakes have been struck and which appears to have been used as a discoid or a chopping tool (fig. 5, *7*).

K. KAYAMOLI (58L/2, A3)

This further site was visited by one of the writers, but no collection from it is available for study. It lies on the eastern fringe of the Kudiraimoli *ṭeri*.

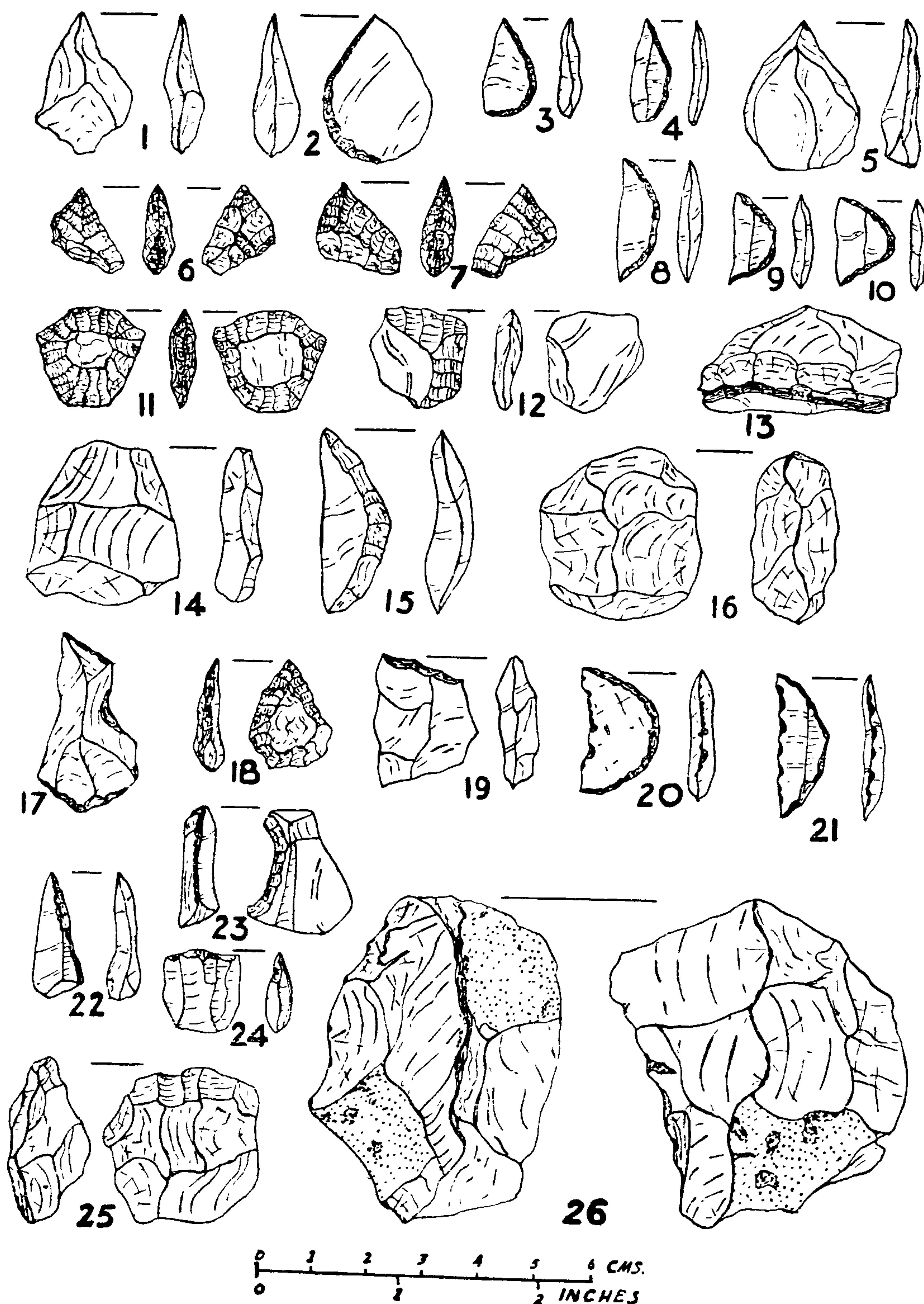


FIG. 2. *1-16, from Kuthankuli: 1 and 5, simple points; 2 and 3, single-trimmed points; 4, asymmetrical point; 6 and 7, bifacial points; 8, 9 and 15, lunates; 10, transverse arrow-head; 11 and 12, unclassified edge-tools; 13, horse-hoof scraper; 14, flake; 16, discoid. 17-26, from Kuttampuli: 17 and 22, asymmetrical points; 18, unifacial point; 19 and 20, transverse arrow-heads; 21, lunate; 23, hollow scraper; 24, flake; 25, discoid; 26, chopping tool.* *See pages 9-11*

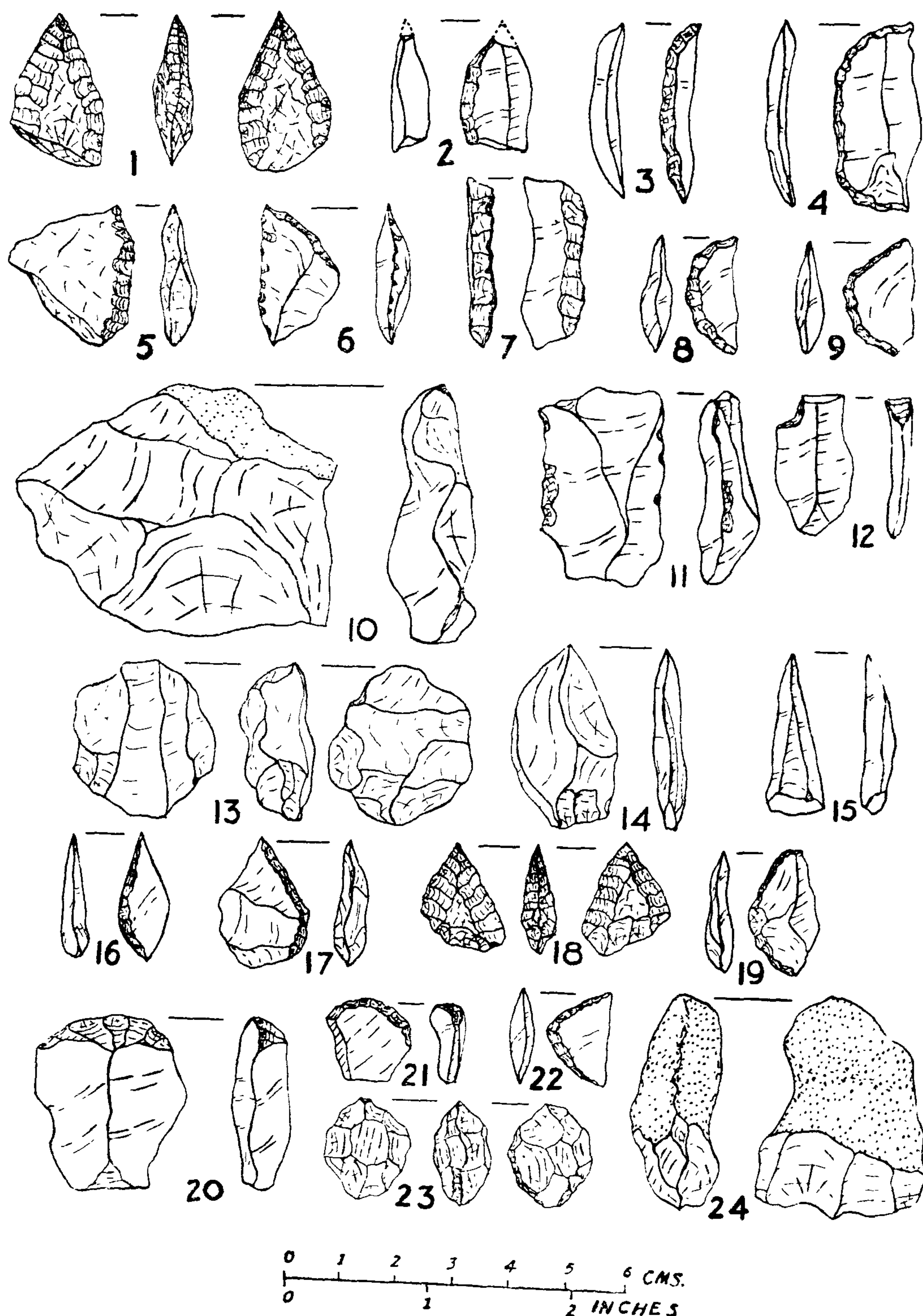


FIG. 3. *1-13, from Sawyerpuram: 1, bifacial almond-shaped point; 2, asymmetrical point; 3, 4, 8 and 9, lunates; 5 and 6, transverse arrow-heads; 7, backed blade; 10 and 11, flakes; 12, microburin; 13, discoid. 14-24, from Puttan Taruvai: 14 and 15, simple points; 16 and 17, single-trimmed points; 18, bifacial point; 19, lunate; 20, end-scraper; 21, thumb-nail scraper; 22, transverse arrow-head; 23, discoid; 24, chopping tool.* *See pages 11, 13 and 14*

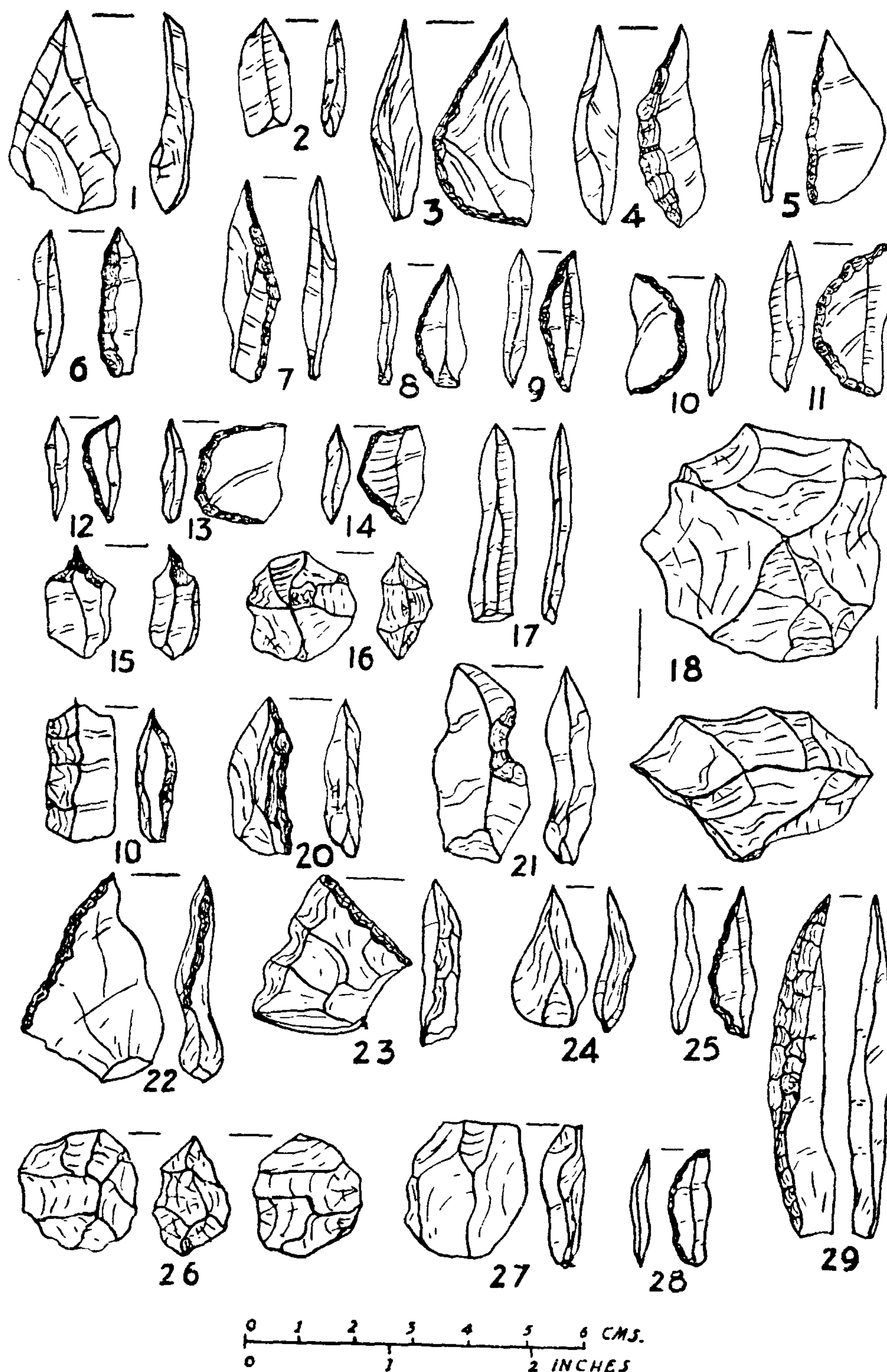


FIG. 4. *1-21, from Kulattur: 1 and 2, simple points; 3, 4 and 5, single-trimmed points; 6, backed blade; 7 and 8, asymmetrical points; 9, 10 and 11, lunates; 12, triangle; 13 and 14, transverse arrow-heads; 15, awl; 16 and 18, discoids; 17, blade; 19 and 20, worn tula flakes; 21, concave scraper. 22-29, from Kattalankulam: 22, single-trimmed point; 23, double-trimmed point; 24, simple point; 25 and 29, asymmetrical points; 26 and 27, discoids; 28, lunate.* *See pages 12 and 13*

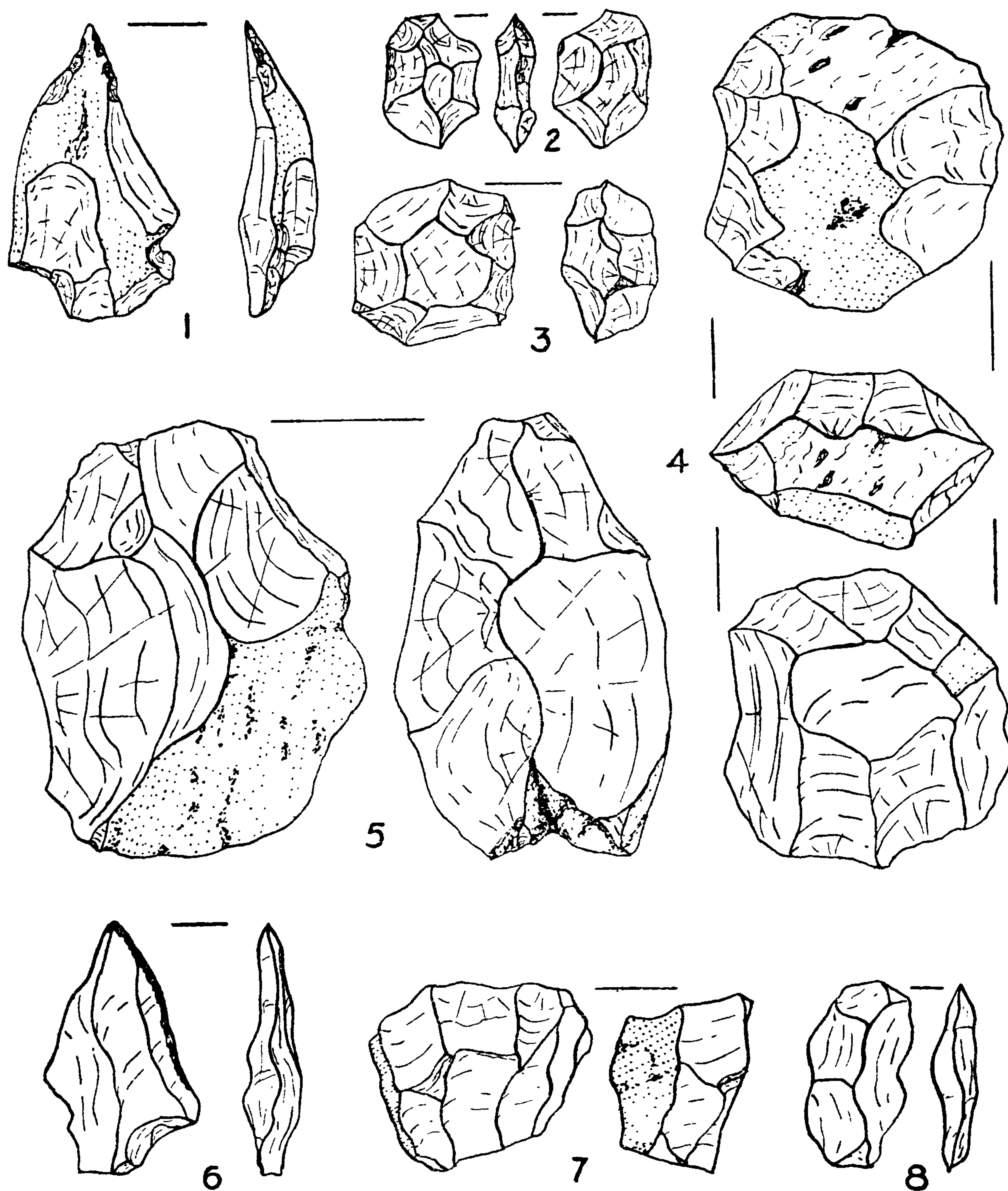


FIG. 5. *1-5, from Megnanapuram: 1, simple point; 2-4, discoids; 5, chopping tool. 6-8, from Manadu: 6, single-trimmed point; 7, discoid or chopping tool; 8, flake.* $\frac{1}{1}$. *See pages 9, 10 and 14*

3. GENERAL OBSERVATIONS

With the probable exception of Megnanapuram, the tools from all these sites may be regarded as belonging to a single industrial tradition and as constituting an industry in the true sense. As material from all the sites except Kulattur is more or less heavily stained with red hydrated ferric oxide, indicating that it is derived from a soil-profile now in process of denudation and forming part of a series of fossil aeolian sands, it seems reasonable to call this the Tinnevelly Ṭeri industry. The distinguishing features of the industry are the use of quartz and chert as raw materials in more or less equal quantities and the presence of geometric forms made indiscriminately on flakes and blades, together with discoids, small chopping tools and points of various types, including a small number of bifacial pressure-flaked specimens. The latter are of particular interest, as they do not occur elsewhere in India, though they are found in Ceylon in small numbers. As far as is known at present, this is the only occurrence of the pressure-flaking technique in India. The use of quartz is common to Ceylon, Tinnevelly, the Mysore plateau and Calicut, as is the indiscriminate use of flakes and blades for geometric forms. Another factor which is common to these regions and possibly concomitant to the use of quartz as a raw material is the poor quality of the blades compared with those of north-west and central India and the north Kanara region, where chert, chalcedony, jasper and other more tractable materials with a smooth conchoidal fracture were used almost exclusively. The elaborate preparation of cores and the production of long narrow blades practised further north is obviously impossible when quartz is used. The resulting short thick blades and amorphous cores are typical of the southern industries. The reason for the choice of quartz as a raw material when other more tractable kinds of silica were available remains a mystery, as it is in Ceylon.

4. PONDICHERRY

The only other group of artefacts that has been reported from Tamilnad is a small collection made by Bonnois in Pondicherry, now in the Musée de l'Homme in Paris. Though it does not form part of the Tinnevelly *ṭeri* area, it has to be discussed in this context.

The flaked tools are all of chert and other kinds of silica with a conchoidal fracture, and the whole assemblage is typical of the south Indian Neolithic. It would appear that, with the change to a neolithic economy, quartz was abandoned as a raw material for tool-making. This is similar to the change which can be observed further north in Bellary. The tools were all stained reddish brown, similarly to those from the Ṭeri sites, but unfortunately no information regarding the site where they were found was to be had (nor whether they all came from one site). It is, therefore, impossible to tell whether the cause of staining was the same. The collection may be classified as follows:—

FLAKES (five). No comment.

BLADE (one), broken.

BACKED BLADES (two), one with steep retouch, and one with rather shallow delicate retouch.

TRUNCATED BLADE (one). No comment.

STONE AXE-BLADES (seven), some ground and pecked, some only ground but all similar to types from the Deccan.

SPHEROID RUBBERS (three), pecked all over.

There were fragments of pottery, also heavily stained and unidentifiable.

5. CONCLUSION

Thus, in Tamilnad we find, on the one hand, the Ṭeri industry unaccompanied by axes, pottery, etc., and almost certainly made by hunting or fishing people who made their temporary encampments on or near the coast, and, on the other hand, an industry which, in its raw material and tool-types, closely resembles the blade-industries of the neolithic and chalcolithic cultures further north, and apparently accompanied by stone axes. In both cases, the tools are considerably stained with hydrated ferric oxide, but owing to lack of information it is impossible to establish the cause of staining in the case of the second group. The relationship in time of the two groups also remains uncertain, although the geological position of the Ṭeri industry indicates a considerable antiquity for them, prior to the appearance of the neolithic culture in the region. The industry from one of the Ṭeri sites, Megnanapuram (above, p. 8), may be regarded as representing an earlier stage in the culture-sequence of the region, prior to the introduction of the blade and geometric forms. The similarity of the other tool-types, however, suggests a continuity between this and the main groups of the Ṭeri industry. We may thus postulate a sequence of three industries from the Tamilnad coast: an earlier Ṭeri industry consisting of flake and core tools: a later, or main, Ṭeri industry similar to the former but including blades and geometric forms; and a neolithic blade-industry, accompanied by stone axes and pottery.

6. ACKNOWLEDGEMENTS

The writers wish to express their gratitude to all those who have helped in connexion with this investigation, in particular to Mr. A. Ghosh, Director General of Archaeology in India, for securing the permits to study the material[1] in London; to Dr. B. Subba Rao, Baroda, for bringing it to the Institute of Archaeology, University of London, and for returning it to India; to Mr. V. D. Krishnaswami for the efficient organization of the visits to the sites; to Mr. P. Devadas, Director of Fisheries, and Mr. J. Fernandez, Superintendent of the Fisheries Technological Institute, Madras Government, for helping the expedition in Tuticorin; and to the authorities of the Musée de l'Homme, Paris, for their permission to study the Pondicherry material.

[[1] The material consisted of the collections made in 1949 by the expedition led by Professor F. E. Zeuner, in 1950 by Shri N. R. Banerjee and Shri K. V. Soundara Rajan, who, jointly with Shri V. D. Krishnaswami, read a paper, 'Microliths of Tinnevelly', in the Indian Science Congress, Calcutta (1951), and in 1951 by Shri B. B. Lal. All the collections were sent to Professor Zeuner in 1954.—Ed.]

THE MEGALITHIC PROBLEM OF CHINGLEPUT IN THE LIGHT OF RECENT EXPLORATION

By N. R. Banerjee

CONTENTS

ONE of the main problems of Indian archaeology today is in respect of the megaliths, the burial-tombs in which large-sized stones were variously used. The problem relates to: who the megalithic folk were, whence they came, the mode of burial involved and the dates of their emergence and disappearance, not to speak of the details of their material culture.

Megaliths abound in the south, and it would not be far wrong to state that peninsular India marks the bounds of the distribution of megalithic monuments, though they have indeed been reported from as far west as Karachi and as far north as Delhi and Almora, not to speak of the large number of them near Nagpur in Madhya Pradesh.[1]

Until 1944, the subject of the megaliths had been only sporadically studied, and there had been no systematic attempt to make a complete note of their features, contents and distribution with a view to classifying them typologically and arriving at even tentative conclusions regarding their use and generally framing a compendium of field-data. In the year 1944, a regular survey of megalithic monuments and sites was taken up by the Archaeological Survey of India with these objects in view, and by 1948, the whole of Chingleput District, covering a little over 3000 square miles, was thoroughly explored (fig. 1). This resulted in the discovery of nearly two hundred sites in the District, and the collection of an enormous amount of data.[2]

[1] R. E. M. Wheeler, 'Brahmagiri and Chandravalli 1947: Megalithic and other Cultures in the Chitaldrug District, Mysore State', *Ancient India*, no. 4 (1947-48), p. 302.

[2] The result of the survey has been briefly mentioned in K. R. Srinivasan and N. R. Banerjee, 'Survey of south Indian megaliths', *Ancient India*, no. 9 (1953), pp. 105 ff.

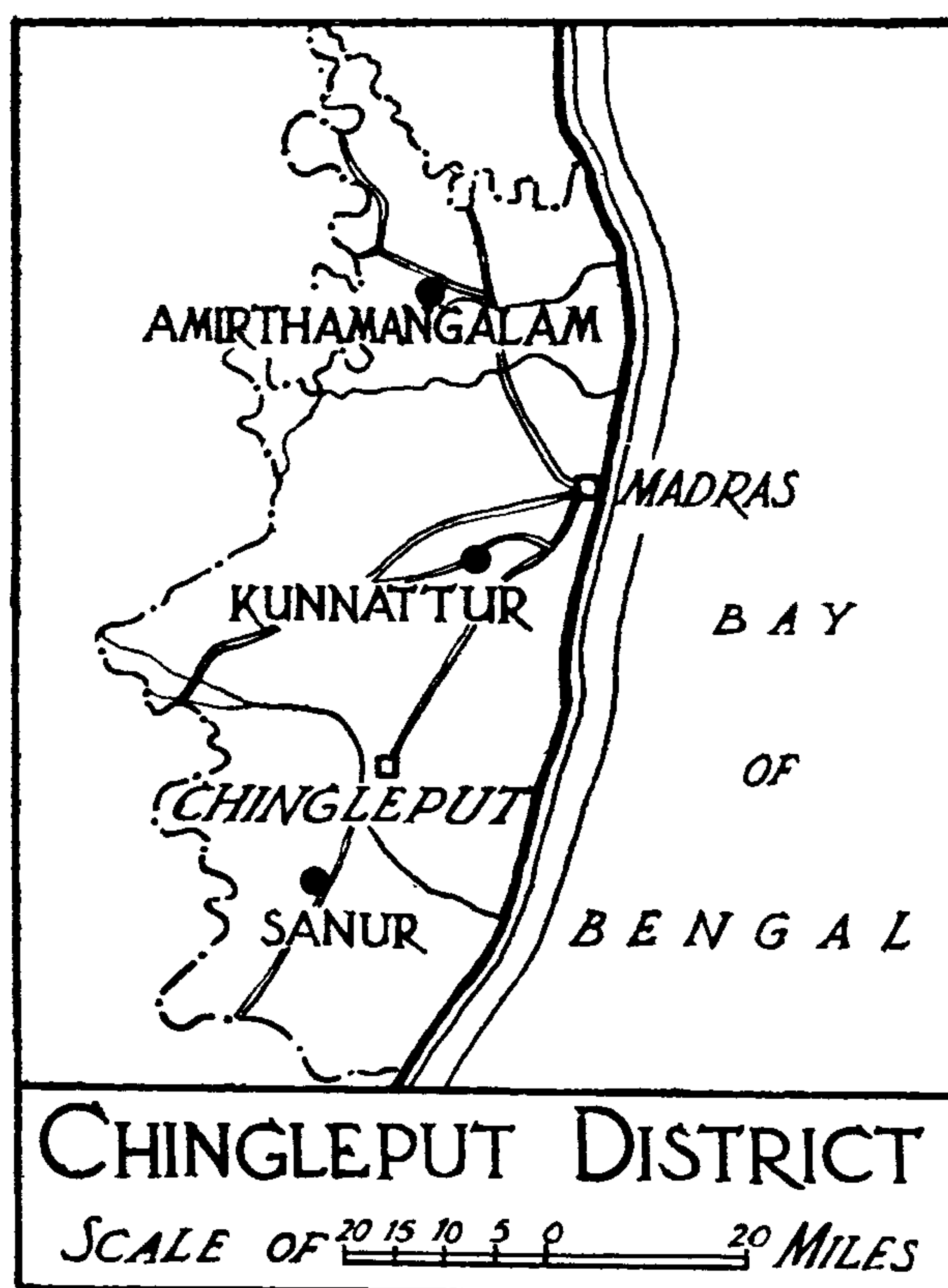


FIG. 1

1. MEGALITHIC TYPES

The simplest form of a megalithic monument is a 'stone circle' or circle of stones holding together a low mound or tumulus. While this is almost a common characteristic of all megalithic monuments, the variety of tombs actually enclosed is wide. The following types of megalithic monuments have been met with in the District:

(1) stone circles;

(2) dolmenoid cists built of unhewn stone boulders, covered with a capstone (D2 type) with a variant in the form of a monument with its capstone lying flush with the cairn-heap (D3 type); and

(3) dolmenoid cists of dressed stone slabs (D1 type).[1]

The last two are also surrounded by stone circles.

To the list may be added a fourth type of monuments called barrows,[2] i.e. low mounds with a scatter of chips of granite on top but without the appendage of the stone circle. Though, therefore, they are not strictly 'megalithic', they are affiliated to megaliths by the nature of their contents.

The stone circles entomb urns, in singles or in multiples, and occasionally sarcophagi and also pits. They vary in diameter from about 18 ft. to 139 ft.[3]

[1] V. D. Krishnaswami, 'Megalithic types of south India', *Ancient India*, no. 5 (1949), pp. 36 ff. The three types are respectively illustrated in *ibid.*, pls. XII A, XI B and IX B.

[2] *Ibid.*, pl. XII B.

[3] Srinivasan and Banerjee, *op. cit.*, p. 111.

The dolmenoid cist generally encloses sarcophagi. The barrow contains urn-burials and rarely sarcophagus-interments.

In this connexion, it should be mentioned that the dolmenoid cist chambers are roughly rectangular in shape and are normally oriented east to west. If the monument is built of slabs, the eastern slab has a circular port-hole, varying in diameter from about 1 ft. 9 in. to about 4 in.[1] In monuments built of unhewn orthostatic boulders there is usually a built-up passage on the eastern side (pl. VI). That the orientation and the passage on the eastern side are interconnected cannot be denied, though it is difficult, if not impossible, to infer its significance. One purpose of the passage may have been, as we shall see later (p. 30), to introduce the grave-goods. In this context, however, the dwindled 4-in. diameter of the port-hole can at best be a conventional feature.

2. ELEMENTS OF THE MEGALITHIC CULTURE

The District of Chingleput can be roughly divided into two geological zones, viz. the southern granitic zone comprising the Taluks of Madurantakam, Chingleput, Kancheepuram and Sriperumbudur, and the northern lateritic zone comprising Tiruvallur, Ponneri and Saidapet Taluks. That geology had a considerable influence on the determination of the form and distribution of megalithic monuments has been amply shown by the evidence in Chingleput. Megaliths are usually found to occur on the slopes of hills or hillocks or amidst rocky outcrops, for the obvious reason of easy availability of stones. In the granitic zone there is no attempt at dressing the slabs or stones used in building the monuments, as granite, being hard, is not easily tractable; but in the lateritic zone the monuments are invariably made of dressed slabs or stones, as laterite, being very soft on first exposure, lends itself to easy dressing and shaping.

On the basis of field-data certain conclusions could be arrived at in respect of the megalithic culture, even before they were opened up by excavations.

Structurally the area of the District proved to be a homogenous unit, while hybrid and transitional types were noticed in peripheral regions of the adjoining Districts of Chittoor, North Arcot and South Arcot.

The megaliths were found on the slopes of hills or amidst rocky outcrops on a high ground or at best on a peneplain, but always in association with large irrigation-tanks, holding, from the rainfall in the surrounding catchment-area, a perennial supply of water, owing to the natural lie of the land, and with arable lands in the neighbourhood. The hills or outcrops supplied the material out of which the monuments were built, and the arable lands, made fertile by the waters of the tanks, supported the people, whose remains the megaliths bear. Since the waters of the tanks created conditions for the population to thrive, the megaliths were naturally concentrated in areas where there was an adequate rainfall. This is borne out by the distribution of the monuments themselves. In this, one factor is to be particularly noticed. The megalithic folk seldom allowed the tombs to encroach upon arable lands and always kept them confined to the barren high grounds. It is clear, therefore, that the authors of the megaliths were a settled people who practised agriculture and knew the value and use of irrigation. It may not be wrong to regard them as the introducers of the irrigation-system in the south by the tank-irrigation method, which involved the collection of rain-water flowing down from the surrounding catchment-area by bunding up the sloping side—a practice which is still in vogue; and many of the

[1] Meadows Taylor, 'Description of cairns, cromlechs, kistvaens and other Celtic, Druidical and Scythian monuments in the Deccan', *Transactions Roy. Irish Academy*, XXIV, pt. iii (1862), p. 331.

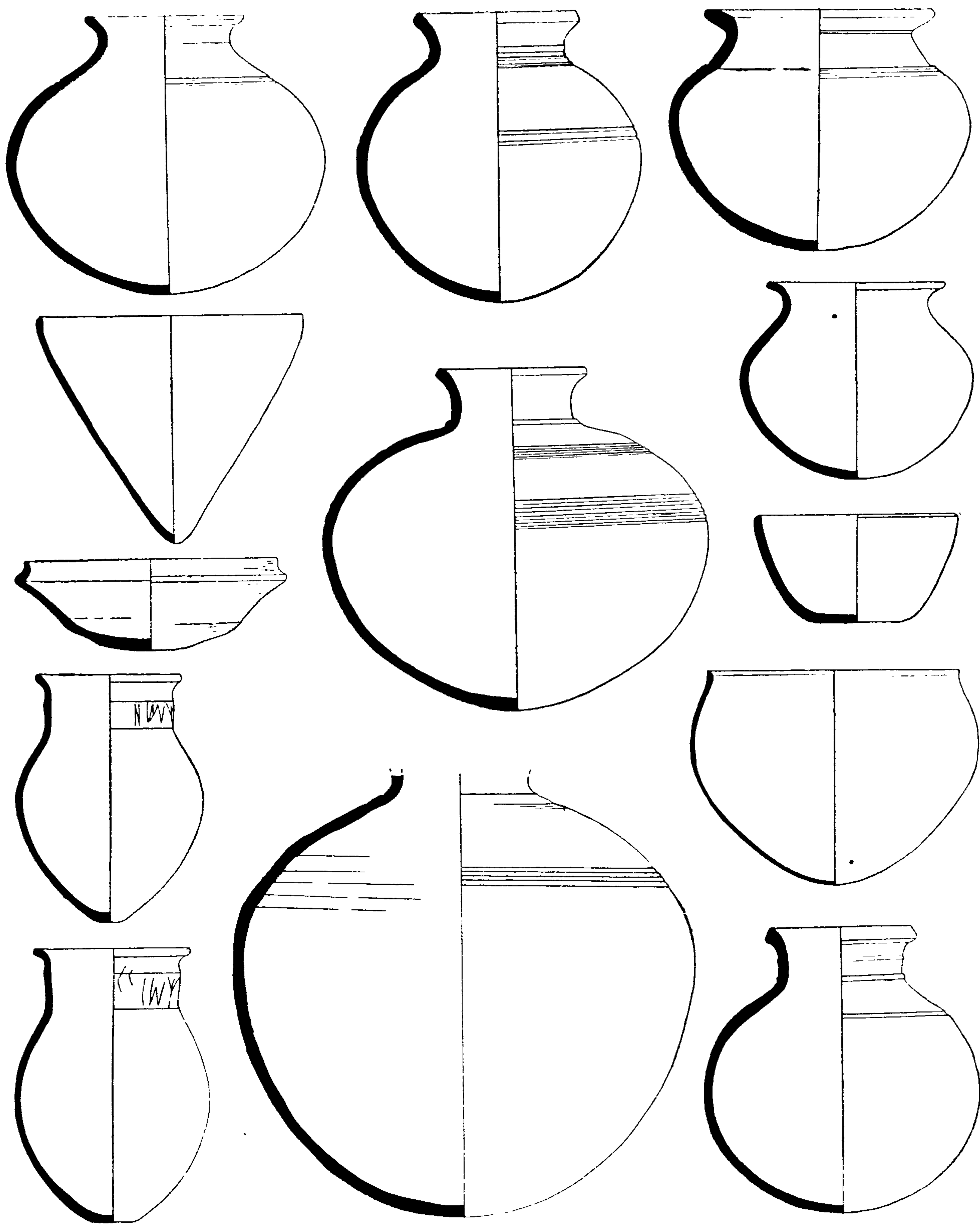


FIG. 2. *Megalithic pottery-types.* $\frac{1}{4}$

old tanks associated with megaliths are still functioning and fertilizing tracts of arable land.

The contents of the megaliths included, apart from the cranial and skeletal remains, a large numer of pots, besides cruder urns and sarcophagi, a large number of iron objects of diverse shapes, sizes and utility and shell and other objects.

The art of ceramics was apparently well-advanced (figs. 2 and 3). Though much credit cannot be allowed for the production of the sarcophagi or the urns, they still serve to show an advance in ceramics: the mixing of chaff and other combustible material in the clay and the provision of holes at intervals indicate the potter's anxiety for a proper burning of the material and providing of channels for the escape of gases to prevent bursting or cracking. The pottery of red and black wares and the Black-and-red Ware bear a degree of fineness. Both the red and black wares are treated with a slip, are wheel-made and well-fired and are usually of fairly uniform texture. The black ware bears greater polish than the red. The characteristic Black-and-red Ware, produced by the inverted firing technique, is indeed the most advanced. It is treated with a slip, polished and occasionally salt-glazed to produce a shiny effect, though resulting in a crackling of the surface. This Ware is commonly found in all megalithic monuments, wherever they occur. This again presupposes settled habits among the folk and extensive mutual contacts through trade or other channels of intercourse, unless this is to be ascribed to a much more deep-seated cause, viz., the ethnic and cultural homogeneity of all the megalith-practising people.

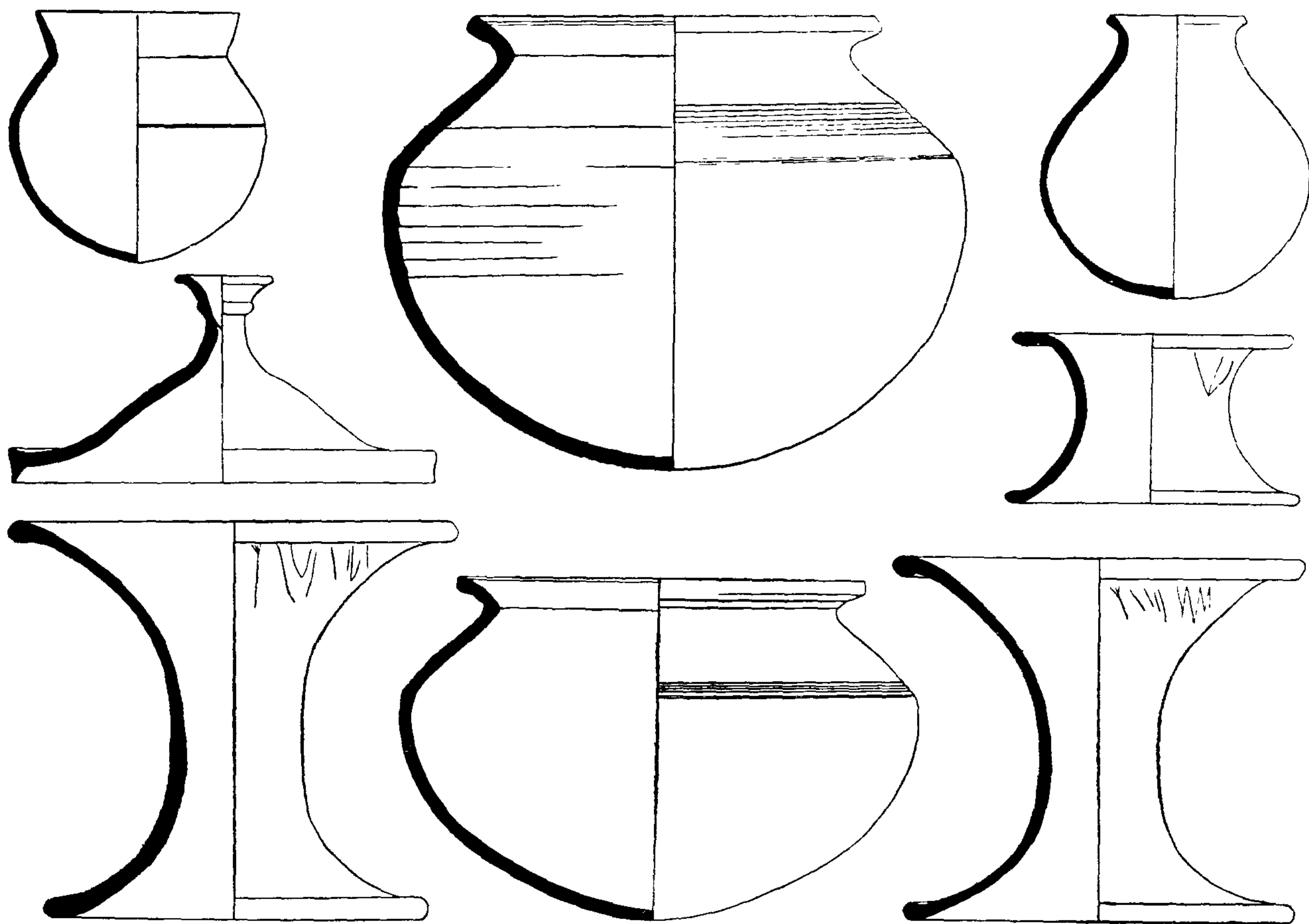


FIG. 3. *Megalithic pottery-types.* $\frac{1}{4}$

The large number of iron objects found in the megalithic tombs indicate the mining of iron and the industries of smelting and forging, apart from the uses to which they were put, and all this bespeaks an advanced state of culture. The objects are mostly weapons of war, viz. swords, daggers, spears, arrow-heads and knives. The find of horse-bits points to the use of the horse as a means of transport in war and peace.

The other objects, such as an occasional terracotta figurine (pl. I A), household objects, a ball of quartz (pl. I C) and beads of carnelian or terracotta (pl. I B), indicate the nature of the contemporary society and objects of daily use. These also include ornaments of conch-shell (pls. II and III). While the shell objects in the megaliths represent the earliest known archaeological evidence on the use of such objects in south India, the Śaṅgam literature is full of references to the making and use of shell bangles, rings, etc. Though the wearing of shell ornaments was common enough even in the twelfth century as the literary evidence goes, it is rather curious that shell has now disappeared from the wear of respectable women.

The large number and variety of objects interred, alongside the fragmentary remains of bones, indicate perhaps the anxiety of the living to provide the dead with their favourite weapons and articles of material comfort, like food and drink and personal decoration, to help them through the passage to the other world. This also presupposes a belief in post-mortem life.

The most crucial and controversial evidence, however, is in respect of the mode of burial itself. The megaliths are found to be burials of a secondary nature; after death the body was left exposed for a considerable length of time, and subsequently the available bones, salvaged from the feasts of beasts and birds, were interred without reference to their normal articulation, along with the other objects, in the megalithic tombs. Usually skulls, a selection of long bones, ribs and mandibles formed the bulk of the collection. Often more than one skull and bones of more than one individual have been found buried together. Gordon Childe has indeed referred to megaliths being multiple burials,[1] but he has also suggested that the tombs were probably used as vaults, where interments were made repeatedly. However, evidences for such re-use of tombs have not been found in Chingleput.

The method of interment involved in the megaliths is called post-excarnation, i.e., after exposure, and there is apparently no trace of or evidence for any primary burning of the body, which would result in the calcination of the bones. Since the skeletal remains do not appear to be calcined, there was possibly no primary burning of the body. Needless to say, the burials entombed in the megaliths are fragmentary. No example of a primary burial has so far been found in Chingleput District. The evidence of Tamil literature is, however, silent in this respect, though megaliths and associated monuments are described at length in various contexts.

From the elaborate structure of the megalithic monuments and the involved and detailed process of interment, it can safely be inferred that the practice of megalithic burial, starting from its construction and ending with its sealing, was the result of a concerted effort of the entire community. Such an elaborate and enormous effort indicates a great reverence with which the dead were regarded, and in this reverence may be recognized that urge which may have given the cult a religious colour. In a way, the megaliths are indeed a crude form of the *stūpa*, and, containing that they do the earthly remains of the

[1] V. Gordon Childe, 'Megaliths', *Ancient India*, no. 4 (1947-48), pp. 5 ff.

dead, they stand at once as commemorative and reverential objects, the construction of which was the joint responsibility of the whole community.

3. PIT-CIRCLES

Wheeler has supposed, on the basis of the evidence at Brahmagiri, Chitaldrug District (Mysore), where extensive excavations at a megalithic site were carried out by him in 1947, that the pit-circles there may have been used as macerating pits or 'inverted towers of silence', where bodies were exposed and later a few selected bones picked and interred in a cist-grave.[1] In support of this view he has suggested that the four slabs of granite found at the bottom of the pits might have supported the legs of a bier resembling a modern charpoy, depending for this interpretation upon general grounds of inference.

In the light of the evidence in Chingleput and for other reasons the following points may be considered.[2] At Brahmagiri there is no trace left, in the section of the fillings of the pit-circles, of the bier, whatever material it might have been made of. The continued existence of bones on the top of the primary filling inside the pits including skulls and long bones does not lend adequate support to the idea of maceration. Likewise, the absence of bones in one of the pits (Megalith II) and the presence of a few bone splinters in another (Megalith IX) at the same site do not appear to be an argument in favour of the maceration idea while considered along with the evidence from Sanur, where bones have not been found in two of the excavated megaliths. Megalith IV at Sanur, though a cairn-circle (pl. IV A) in outward appearance, was in reality a dolmenoid cist-circle with a sarcophagus-interment (pl. IV B) and did not contain a single fragment of bone. Likewise, Megalith III of that place, a dolmenoid cist-circle of the D2 type (pl. V A), enclosing a small sarcophagus (pl. V B), did not contain any bone either, and Megalith I yielded only some splinters of bones as Megalith IX of Brahmagiri.

This absence of bones in the tombs may be attributed to an inexplicable accident like the inability to find the excarnated bones or the emergence of a dispute among the kinsmen of the dead soon after the megalith was prepared and the body left for excarnation, which resulted in the destruction of the grave or abandonment of the tomb itself. There is no indication of any natural collapse of the sides of the pit to have caused disturbance.

The existence of other furnishings in the primary filling of pits at Brahmagiri, consisting of pottery, iron objects, carnelian and gold beads, conch-shell, etc.,[3] akin to the furnishings of the cist-graves, indicates as elaborate a ritual as that of the cist-burial and does not suggest a comparatively simple purpose of maceration.

Maceration stipulates that the pit-graves must have been kept open for some time: yet the fact that as many as thirtythree gold beads were not stolen but allowed to lie alongside the bones in Megalith IX at Brahmagiri seems inexplicable, unless it is attributed to an accident or to the extremely good nature of the contemporary folk.

Wheeler has also referred to the practice of the selection of bones from the pits. Though the preponderance of bones in the cist-graves is of long bones and skulls, the abandonment of two skulls and long bones in Megalith VII (a pit-circle) at Brahmagiri

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[1] Wheeler, *op. cit.*, pp. 194-99.

[2] In the following lines I humbly differ from the views of Dr. (now Sir Mortimer) Wheeler, to whom I owe my introduction to field-archaeology.

[3] Wheeler, *op. cit.*, pp. 194-99.

runs counter to the idea of a selection from the maceration-pit unless it is attributed again to an accident.

It has been pointed out that as many as nine pit-circles were noticed at the site which contained upwards of three hundred megaliths. The existence of a multiplicity of 'towers of silence', except for a wide range of time, seems to be untenable, and the evidence of neither Brahmagiri nor anywhere else in India points to a very wide range of life for the megalithic cult. The Parsees do indeed have an elaborate 'tower of silence' for a particular area, but not more than one for a very small area like the site of Brahmagiri.

If the pit-circle was indeed for maceration, we can have no idea about its actual active life. The question as to the duration of the time when it was kept open, the number of occasions or deaths for which it was used and why it was finally and elaborately sealed at all have not received satisfactory answers. Besides, if each maceration involved an elaborate ritual of offerings of pots, iron objects and ornaments etc., there would indeed be no end to the number of such objects in any single pit if it was repeatedly used. If the pit was used for maceration only once or during a particularly short period of time, the elaborate arrangements would seem disproportionately heavy; besides, one would expect that there would be nearly as many maceration-pits as cist-graves. In the circumstances we may have to look for the place for maceration elsewhere than in the pit-circles.

4. EXCAVATIONS

Between 1950 and 1955, excavations were conducted at two megalithic sites in Chingleput District, viz. at Sanur in Madurantakam Taluk, 45 miles south of Madras, and Amirthamangalam, about 30 miles north of Madras, in Ponneri Taluk. These two sites respectively represent monuments in the granitic and lateritic zones.

A. SANUR

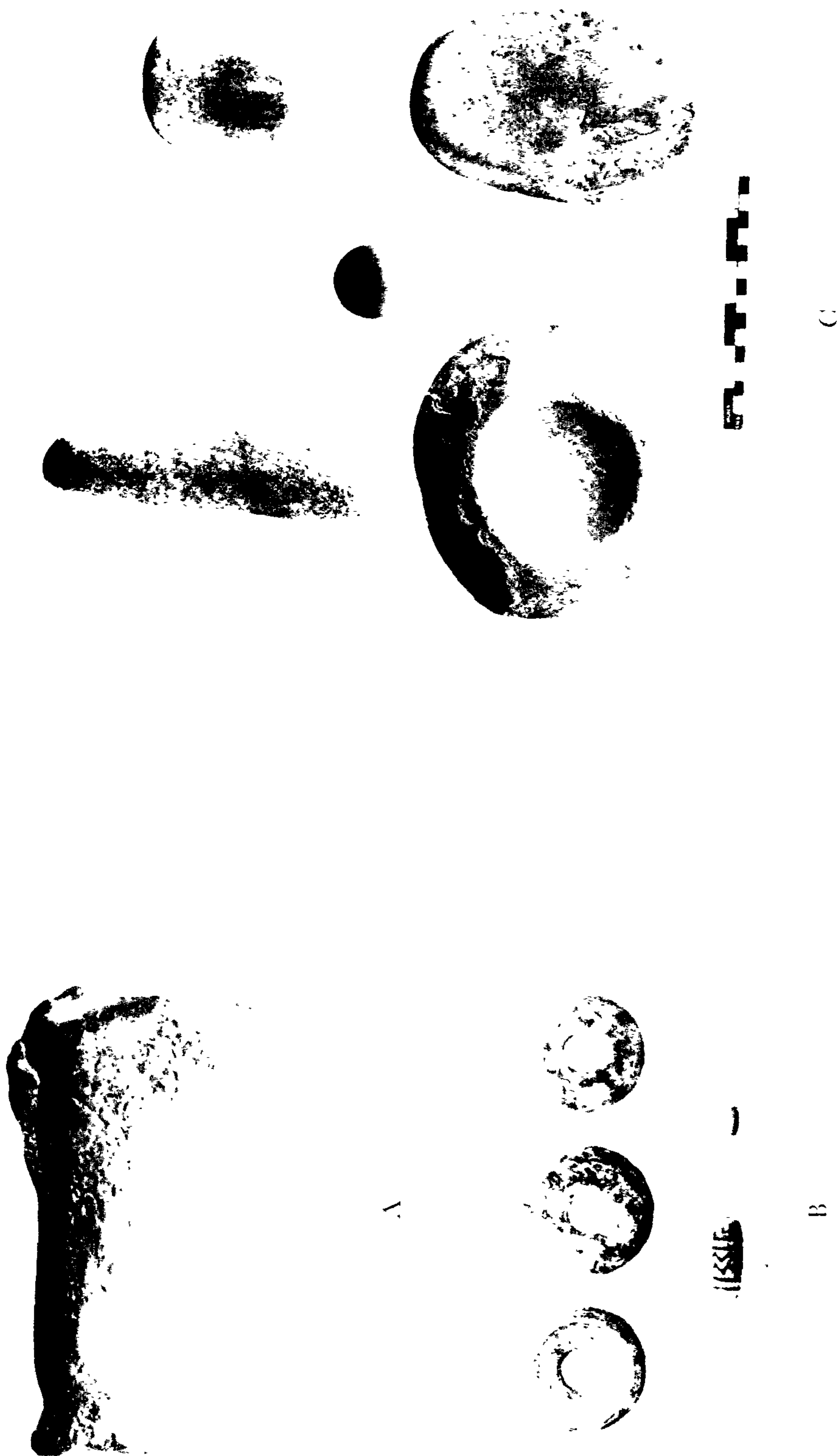
Sanur is the most representative of the sites in Chingleput, as it contains monuments of all the types enumerated above (p. 22), except barrows. Five megaliths were opened here in two seasons, during the summers of 1950 and 1952 respectively.

The excavated megaliths fell broadly, from their surface-indications, into three categories, viz. (1) cairn-circles (Megaliths V and IV), (2) dolmenoid cists of rough unhewn boulders of D2 type (Megalith III) and (3) dolmenoid cists with flush capstone of D3 type (Megaliths I and II). But on actual excavation four of them were found to be of the dolmenoid cist type, D3, and the fifth to be a case of pit-burial. Excavation also revealed that there was no real distinction between D2 and D3 types, except that the former represented a stage in the disintegration of the cairn-heap, obviously due to erosion, exposing the upper portions of the dolmenoid cist.

As the details are reserved for a fuller report, only the broad outlines of these excavations may be considered here.

(i) *Megalith V*

The pit-burial, described as Megalith V, was, by surface-indication, a large cairn-circle (pl. VII A) but was found to entomb a pit measuring 9 ft. × 8 ft. and 7 ft. 6 in. deep (pl. VII B). The interments, consisting of bones, iron objects and pottery, were



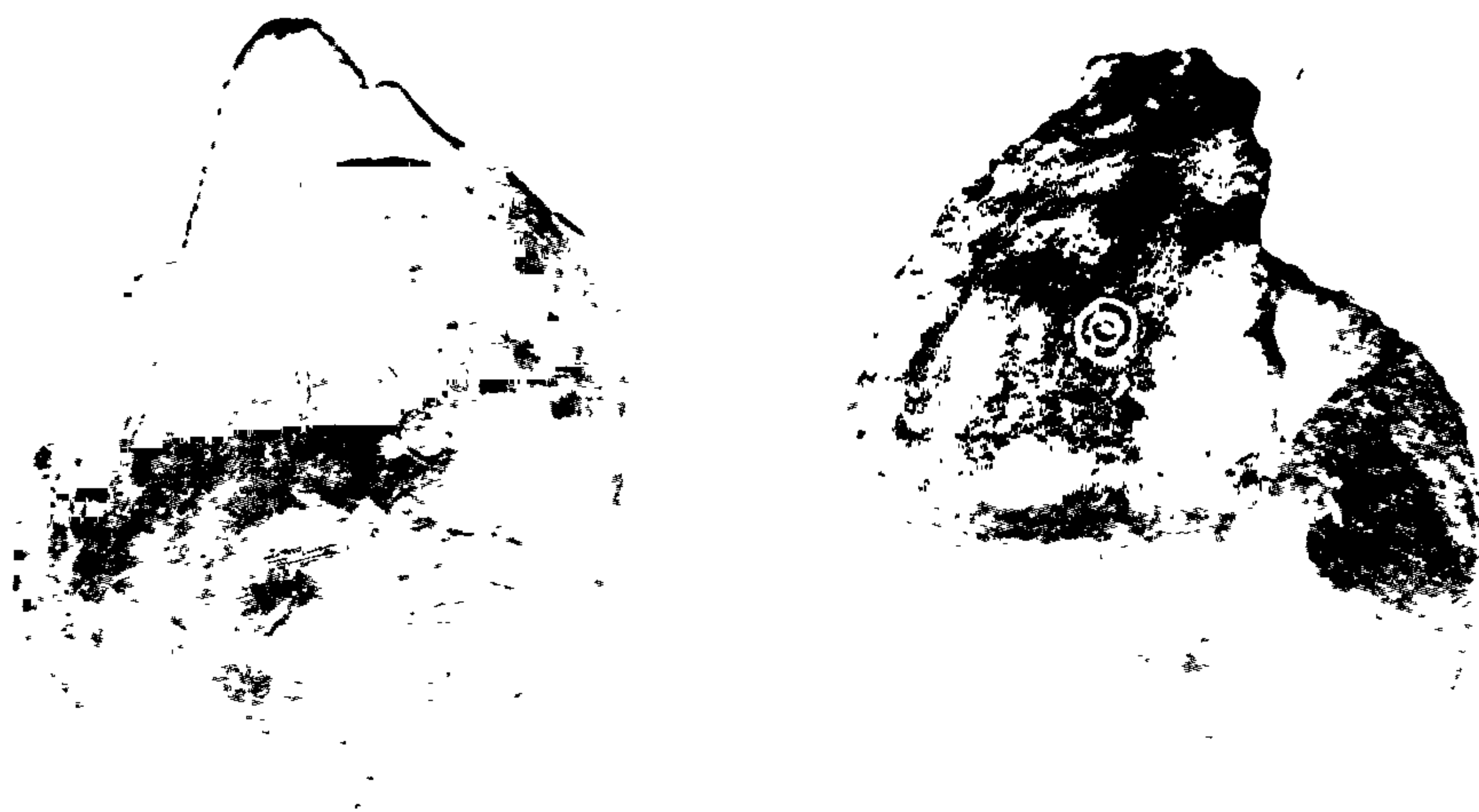
Sana : miscellaneous objects : A, terracotta animal-figurine, B, terracotta and carnelian beads, and C, stone objects. *See pages 26, 29 and 30.*
Scale of A and B 1/1



Sanur: shell ornaments. *See pages 26 and 29.* Scale $\frac{1}{1}$



A



B

Sanur: A, shell beads, and B, decorated shell. *See pages 26 and 29.* Scale $\frac{2}{3}$



A



B

Sanur: Megalith IV, cairn-circle; A, *before, and* B, *after excavation.* *See page 29*



A



B

Sanur: Megalith III, type D2: A, *before, and* B, *after excavation.* *See page 29*

 To face plate VII



Sanur: Megalith III, showing the chamber and blocked eastern passage. *See page 29*



A



B

Sanur: Megalith V, pit-circle: A, before, and B, after excavation. *See page 28*

To face page 29



A



B

Sanur: Megalith I, type D3: A, *before, and* B, *after excavation.* *See page 30*

placed along the edges of the pit but at different levels, while objects of shell were thrown into the centre. The pit contained upwards of seventy pots of the following types: pyriform and fusiform jars and pots; black conical lid; ring-stands of the ordinary and hour-glass shapes; Black-and-red tulip-shaped vessels; conical shouldered vessels; and small bright-red pyriform pots. The iron objects included arrow-heads, spears, wedges, horse-bits, daggers, swords, scrapers, chisels, etc.

A group of skulls and bones was placed in the central space at the very bottom and somewhat pushed to the east. The bones were interred after excarnation and were not in articulation and included *bones of animals* besides human skeletal remains. The fragments of animal-bones represent the species of the domestic humped cattle of India, domestic sheep, domestic goat, wolf or hyena and domestic fowl.[1] The co-occurrence of human and animal-bones is bewildering but cannot be dispensed with as merely accidental. Animal-bones have not occurred in any of the other megaliths excavated here. Incidentally, this evidence goes also against the maceration idea of Wheeler.

Besides pottery, skeletal remains, animal-bones and iron objects, the pit also contained a few objects of shell.

(ii) *Megalith IV*

The other cairn-circle, called Megalith IV (pl. IV A), was in fact found to entomb a monument of the incipient dolmenoid cist type containing a terracotta legged sarcophagus (pl. IV B). This had, however, been so badly battered, presumably during the process of interment itself, and consequently so utterly despoiled that its evidence was of very meagre value. The cause of the disturbance was not clear; since the monument was not a pit-burial, any collapse of the walls of the pit was ruled out.

(iii) *Megalith III*

It was a monument clearly of the D2 type, i.e., exposed dolmenoid cist (pl. V A) varying only in a matter of degree of exposure of the upper portions rather than of detail from the other two remaining megaliths, except that it was smaller than the other two, Megaliths I and II respectively, which are of the D3 type.

The dolmenoid-cist chamber in Megalith III was buttressed up and held in position by a neat inner circle of stones, concentric with the outer and larger bounding circle.

The dolmenoid cist was approached by a deliberately-constructed passage (pl. VI) on the eastern side. The contents included a terracotta legged sarcophagus (two rows of four legs) containing inside it two carnelian beads (pl. I B) and an iron chisel, but no pottery, and covered with a lid, and upwards of fortyfive pots of varying sizes (pl. V B), shapes and forms surrounding the sarcophagus. The pots were of the following types: Black-and-red bowls and dishes; polished black ring-stands; red pyriform jars; Black-and-red round-bottomed small pots; and a three-legged pot.

The paucity of iron objects and the absence of skeletal remains are peculiar.

[1] From the preliminary report on skeletal remains prepared by Shri H. K. Bose, Assistant Anthropologist, Department of Anthropology, Calcutta.

(iv) *Megalith I*

Megalith I (pl. VIII A) was, by surface-indication, a monument of the D3 type. The dolmenoid cist chamber of this megalith contained five terracotta legged sarcophagi (pl. VIII B) with lids, of varied dimensions. All of them, except one, were oriented east-west, in keeping with the orientation of the dolmenoid cist chamber, the exception being conditioned, as may be inferred, by the availability of space. The pots found inside numbered more than fifty and were of the following types: Black-and-red bowls and dishes; conical vessels; ring-stands; knobbed lids; and pyriform pots. Besides pottery, iron objects like spears and a few fragments of two human teeth (in one sarcophagus) were also found. Pottery was found both inside and outside the sarcophagi at various levels, obviously laid during the process of filling up.

(v) *Megalith II*

Megalith II, which also looked like a monument of the D3 type and was almost similar in construction to Megalith I, was, however, more interesting on account of its contents. The grave-goods placed inside the chamber consisted of three sarcophagi (pl. IX), placed as nearly as possible in the east-west orientation, and more than twenty-five pots of various shapes, a large number of iron objects of diverse forms, a fairly good quantity of skeletal remains including disarticulated bones and two skulls and a round ball of quartz (pl. I C). The bones were found inside two of the sarcophagi, in some of the three-legged pots, and even just outside the sarcophagi. But strikingly enough not a single pot was found in any of the sarcophagi in this tomb. This tomb differed in this important detail from its counterpart, viz., Megalith I.

Both these megaliths had an opening or passage, of course subsequently blocked up, on the eastern side, corresponding in purport to the port-holes of slab-cists.

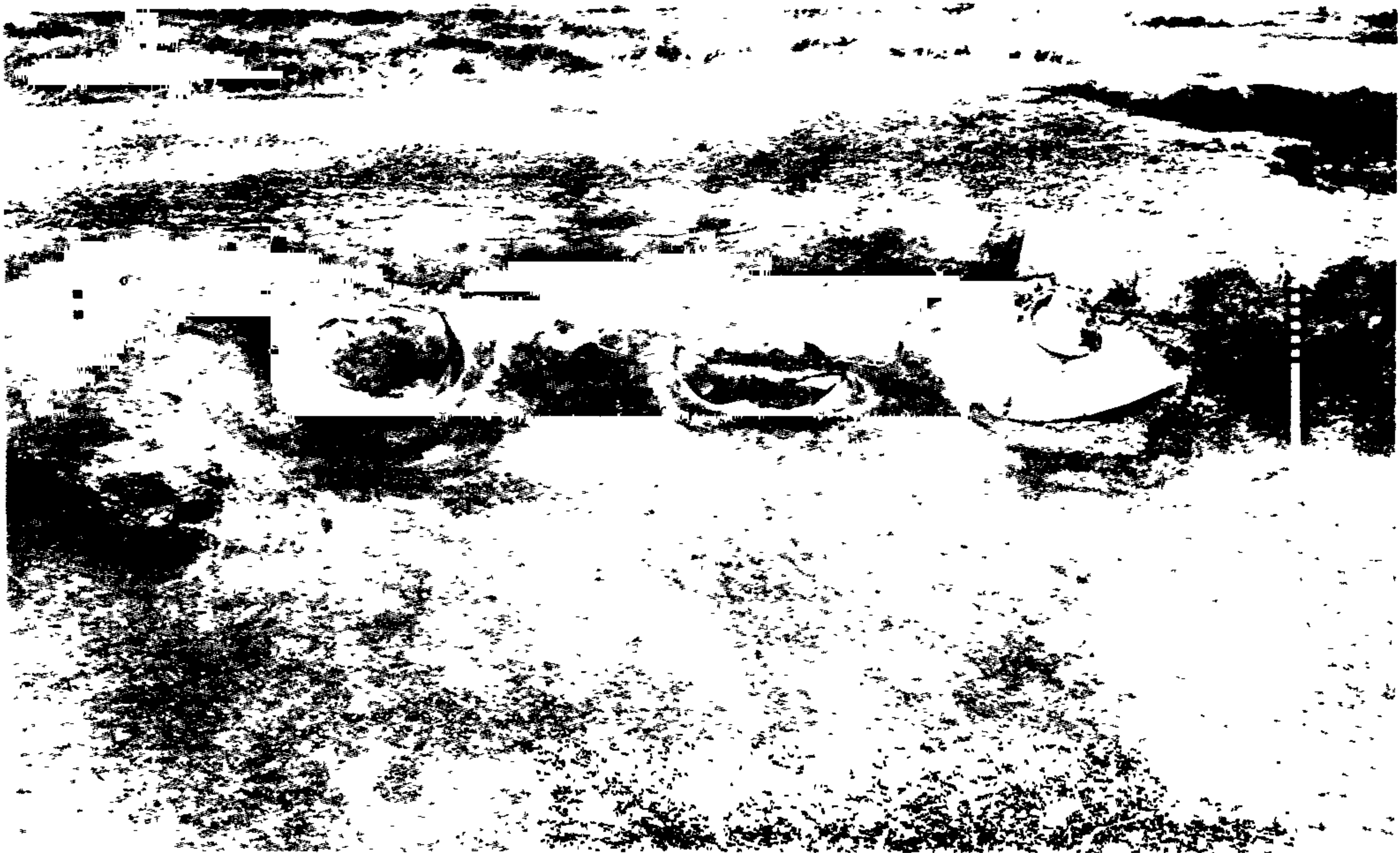
(vi) *General observations*

It would indeed be interesting to note the process of the construction of the tombs and of interment as deduced from the stratigraphic evidence collected during the excavation.

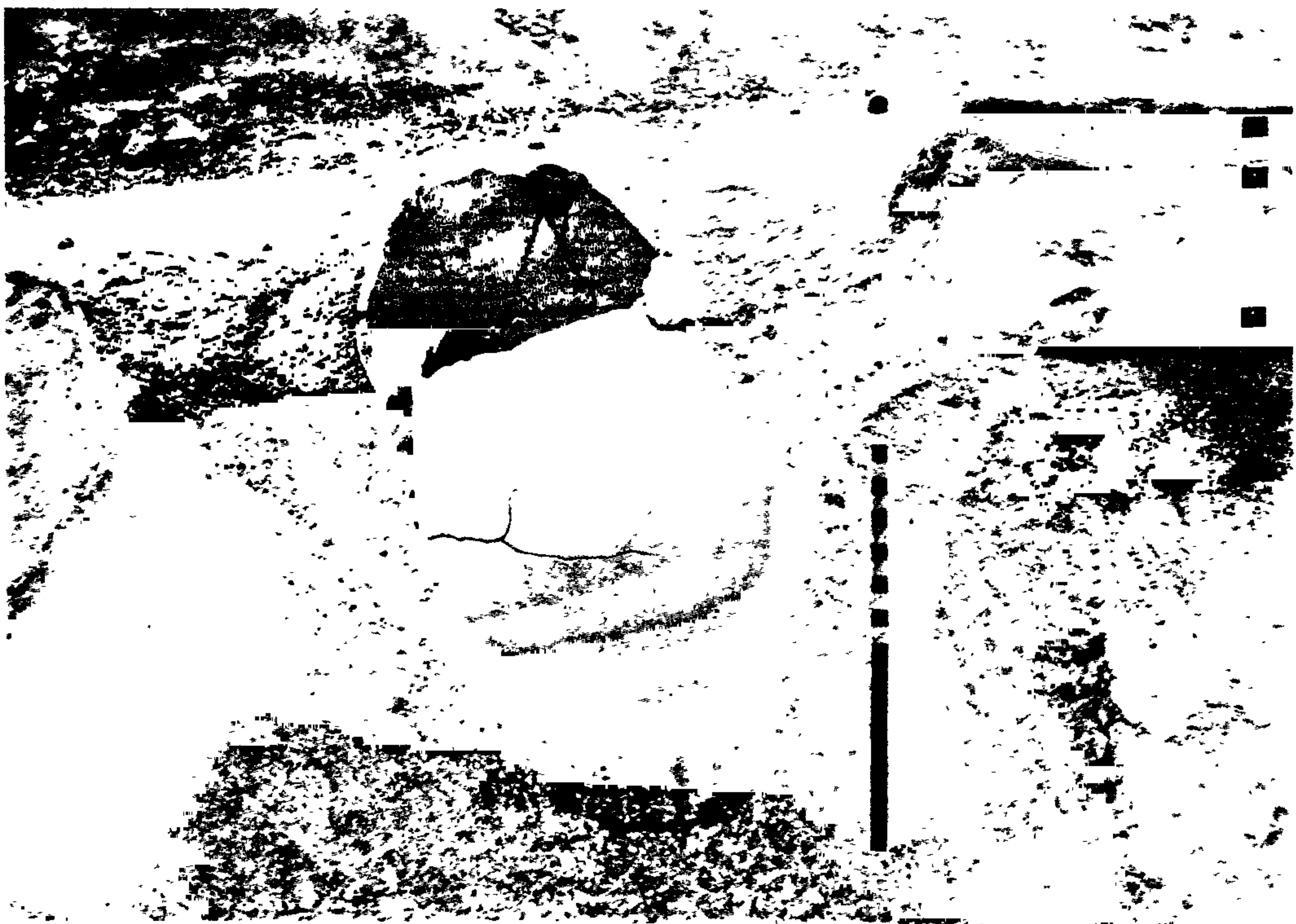
Three stages in the process of the construction of the dolmenoid cists could be inferred from the gathered data. The dolmenoid cist chamber would be the first structure to go into shape, along with buttressing stones, if any, followed by the ring or bounding circle of stones around it. With the completion of the interment of the grave-goods, which would surely have been the next stage of burial-ritual and which, it is reasonable to conclude, would have been introduced *via* the eastern passage, wherever it existed, the passage would be blocked and the whole structure encased in a cairn of rubble and clay. Next, to seal the burial, the capstone, brought slowly over the inclined plane or ramp which the cairn provided, would be hoisted on the orthostats. Finally, a further covering of the same rubble-packing would be placed on the capstone also, thus completely sealing off the burial from view. The interval between the first and the final cairn-packings was indeed negligible: both being of the same material, no stratigraphical difference would be noticeable. In many cases the cairn-packing over the capstone has fallen off owing partly to interference of agencies both natural and human, or because the angle of repose for the original earth and rubble-packing became untenable as the earth-content got



Sanur: Megalith II, type D3; after excavation. *See page 30*



A



B

Amirthamangalam: A, *general view showing exposed burial-urns, and* B, *burial-urn with pedunculated bottom.*
See page 31



Amirthamangalam: pottery and skeletal remains in a burial-urn. *See page 31*

 To face page 31



Amirthamangalam: pottery and skeletal remains in a burial-urn. *See page 31*

slowly washed or blown away. This led to a differential exposure of the capstones and orthostats and sometimes imparted to the capstones the effect of being flush with the cairn. It is clear, therefore, that there is no real difference between the monuments of D2 and D3 types.

It may be noted that the entombed bones and skulls are examples of excarnated skeletal remains as stated above (p. 26). The presence of two skulls in Megalith II indicates multiple burial, and the fact that they lay together only leads to the inference that they were interred simultaneously.

The cairn-filling also contained fragments of crushed or broken pots, probably as the relics of a ritual, say of pot-breaking, connected with the entombment.

B. Amirthamangalam

With the completion of work at Sanur, representative of the granitic zone, the venue of excavation-work was shifted early in 1955 to the lateritic zone. The urn-burial site at Amirthamangalam was first taken up for excavation.[1]

The urns at this extensive site, numbering upwards of two hundred and fifty, exposed and damaged (pl. X A) display a large diversity in size and also vary in shape from the oval to the nearly globular form. All the urns are hand-made and are of coarse texture and thick granular fabric. All of them have a rolled rim, with or without additional decorations below and have either a pedunculated bottom (pl. X B), which obviously pinned them into the earth and helped to keep them in position, or heeled solid bottoms, flat at the lower end, varying in diameter from 4 in. to 11 in. The urns are placed in an adequate pit cut into the lateritic gravel, and even, wherever necessary, into the underlying lateritic bed-rock.

In the process of interment the skeletal material, consisting of a selection of uncalcined, disarticulated and excarnated bones including the skull, long bones, loosened teeth and fragments of ribs, was placed at the very bottom. Over the skeletal deposit were placed a few (three or four) pots (pls. XI and XII) in black or red wares besides a nearly Black-and-red Ware suggesting inverted firing. A few iron objects were also placed inside. The urn was then filled up with earth and covered with a dome-shaped lid (a variant in the form of an oblong lid is also noticed). A few pots were also placed over the lid near its edge. The whole pit was thereafter covered up and sealed. A few blocks of laterite, deliberately cut, appear to have been invariably placed into the top of the pit, along its edge. The tumuli, if any, formed over the interments were not extant, but the pits were sealed by an overlying layer of loose gravelly earth, the flattened top resulting from a possible re-deposition after the washing off of the surface by rains.

On the whole, these burials appear to be simpler than the elaborate megalithic burials. The absence of the stone circle, which is an invariable feature of megaliths, the paucity of pottery and iron objects and the small quantity of skeletal material—all suggestive of a conventional and therefore degenerate mode of disposal of the dead—perhaps indicate a later date for the urn-burials than that of the real megaliths. In this context the occurrence of a few straggling bits of laterite blocks at the edge of the pit may perhaps be taken as the relics of the stone circle.

[1] Excavation has been undertaken early this year (1956) at Kunnattur in Sriperumbudur Taluk of Chingleput District, in the granitic zone.

5. THE MEGALITHIC PEOPLE AND CHRONOLOGY

In the absence of any absolute datable evidence among the antiquities, coupled with the fact that no associated habitation-site was found, we have to remain content, on the basis of certain typological similarities, with the tentative lower dating fixed for the site at Brahmagiri and elsewhere, viz. *circa* 200 B.C. Nevertheless, from the comparative crudeness of the Chingleput monuments, a slightly earlier date may perhaps be postulated for them. In this connexion mention may be made of the 1953-excavation at Sengamedu[1] in Vriddhachalam Taluk of South Arcot District, which, from the extensive distribution, on the surface and in the exposed section in the adjacent river Manimukta, of large quantities of the typical megalithic Black-and-red Ware, appeared to be a habitation-site of the megalithic folk, though no megalithic monument was actually found at the site or nearby. The excavation at Sengamedu was undertaken in the hope of obtaining some evidence on the material culture of the megalithic period and also of datable evidence, if any. It revealed that the entire cultural deposit of 14 ft. at the site over riverine sand was characterized by the occurrence of the Black-and-red Ware, signifying that the deposit represented but one common culture, composed no doubt of different industries. After the accumulation of about 9 ft. of soil, in which the Black-and-red Ware industry dominated, sherds of the Rouletted Ware of the finer variety, dated from about 50 B.C. to A.D. 200, emerged. If the thickness of a deposit can be an index of the time taken in its formation, a fairly early date, possibly anterior to *circa* 200 B.C., is indicated for the initial appearance of the Black-and-red Ware industry at the site.

Besides, the excavation also revealed the remains of burnt-brick structures used by the folk who made the Black-and-red Ware.

The problem of who the megalith-builders were has for long engaged the attention of scholars, but except for the study of the skeletal remains from the urn-burials of Adichanallur, attributed by Zuckerman to the Dravidian stock,[2] the skeletal remains from megalithic tombs elsewhere have not hitherto been seriously studied, owing primarily to the damaged conditions in which they were found. The skeletal remains from the megaliths at Brahmagiri and Sanur are in a no better condition to allow any fruitful study. Thus, in the absence of any other reliable skeletal data, the theory of Zuckerman still holds the ground.

This question has recently been examined from a fresh angle by a distinguished anthropologist, Christoph von Fürer-Haimendorf. Basing his arguments on the evidence of Brahmagiri, he has endeavoured to equate the megalith-builders with the Dravidian-speakers.[3] He accepts Wheeler's argument that the megalith-builders were intruders upon the soil and had a more advanced culture than the earlier primitive neolithic people of the locality but, at the same time, states that it was to them that the edicts of Aśoka, found in the vicinity, i.e. at Brahmagiri and in two other villages in the neighbourhood, were addressed. The date of the Brahmagiri megaliths would therefore go back at least a hundred years earlier than that fixed by Wheeler, viz. *circa* 200 B.C., on the basis of the date of Aśoka. If the vigorous folk who built the megaliths encroached upon the soil,

[1] N. R. Banerjee, 'The excavations at Sengamedu', *The March of India*, June 1956, pp. 43-46.

[2] S. Zuckerman, *The Adichanallur Skulls*, Bull. Madras Govt. Mus., N. S., General Section, I, pt. ii (1930), pp. 19-20.

[3] He first propounded this theory in the course of his presidential address to the Anthropology and Archaeology Section of the Indian Science Congress at Poona in 1950. His views were epitomized in his address to the Conference of Anthropologists at Vienna in September 1952. A summary has been published in *Indo-Asian Culture*, II, no. 3 (Jan. 1954), pp. 238 ff.

it was these very people, he argues, who must have imposed their language upon the soil as appears to him on circumstantial evidence. According to him, as the whole of south India today speaks only Dravidian languages, the language which the megalith-builders brought with them and imposed on the existing population was obviously that of the Dravidians, who, being of a vigorous stock, would not have allowed their own tongue to be overwhelmed or swept away by the primitives.

This leads naturally to the question of the origin of the megalith-builders. Haimendorf, on the analogy of the port-holed cists, which also occur in the Mediterranean region, traces the origin of the south Indian megaliths to that region. But the megalithic monuments of that area cannot be dated, by his own admission, later than the second millennium B.C., whereas the megaliths at Brahmagiri belong to somewhere around 200 B.C. in the present state of our knowledge. This chronological gap he desires the archaeologist to fill, as he believes that the immigration of the megalithic folk took place at some point of contact on the west coast, from where they travelled gradually to the other parts of the peninsula—a process that must have been spread over several centuries. He suggests that the Dravidian immigration might have taken place about 500 B.C., though D. H. Gordon favours the date between 700 B.C. and 400 B.C.

Haimendorf also thinks that the immigration of the Dravidians was not from north India. In support of this view, he points out the dissimilarity of marriage-customs between the north and the south. The system of cross-cousin marriage, prevalent in the south, is unimaginable in the north, except in Maharashtra where it exists limitedly. He argues that Maharashtra was the border-area where the two peoples came into clash and contact, resulting in an intermixture of cultures. He further states that south India also represents the boundary of the area where megaliths occur, and since there are no appreciable traces of megaliths in north India they did not hail from that region. The fact that none of the north Indian languages is of the Dravidian stock points, according to him, to the same direction: the existence of Dravidian elements in the languages of the Kolams, Gonds and Oraons indicates the fact that they lived on the borderlands and hence received a share of Dravidian influence. The existence of positive Dravidian elements in the Brahui language of Baluchistan and of megaliths near Karachi in Sind suggests to him the remains of a later colony established by the Dravidians from their southern centres along the west coast-route, rather than the remains of their earlier existence in the region.

As regards the predecessors of the Dravidians in south India, Haimendorf has some suggestions to make. According to him, the primitive semi-nomadic food-gatherers, who used microlithic tools and survived in the more secluded hill-tracts until historical times, and the neolithic people, who succeeded them, also were the predecessors of the iron-using megalith-builders. The present-day Chenchus and Kadars are regarded by him as the descendants of the makers of the microlithic tools. This would presuppose a south Indian focus of the expansive microlithic and possibly neolithic cultures, the former having a prototype in the widespread chalcolithic culture of western India—a supposition which needs a thorough investigation.

Since Tamil, one of the Dravidian languages, developed into literary form in the early centuries of the Christian era, it must have lived as a *patois* for many a century before that date. The exact period of its undeveloped existence cannot easily be determined, but it may well have started on its career several centuries earlier. Haimendorf favours *circa* 500 B.C. as the possible date of the Dravidian immigration, as that would allow sufficient time for the language to reach the efflorescence displayed in the Śaṅgam literature, which is dated variously from the second or first century B.C. to the fourth or

fifth century A.D. The fact that Aśoka's inscriptions mention at least four well-established kingdoms in south India, which were bound to the northern empire by ties of friendly relationship, also suggests a fairly long period of cultural and even constitutional development among the southern people. In this context, and in the light of the early date of western megaliths, which have several structural features identical with their south Indian counterparts, a date earlier than 300 B.C. may have to be looked for for the introduction of megalithism in India. At best, the date of 300 B.C. applies tentatively to only a handful of explored sites and monuments, while the vast intervening geographical spaces likely to bear megalithic monuments of diverse variety remain unexplored.

Haimendorf's view, therefore, drawing attention to an interesting and important aspect of the problem, deserves a most careful and detailed examination by linguists as well as anthropologists, apart from field-archaeologists.

The monuments on the west coast, consisting particularly of *ṭopikallus*, *kuḍakallus* and subterranean vaulted caves, have not so far been tackled systematically, much less in association with habitation-sites. It is possible that they may throw up interesting light on this problem of the racial affinities of the megalith-builders and their chronology.

Therefore, while the details of the megalithic types, the process of the construction of the tombs, interment of skeletal remains and of accompaniments and the nature of the contemporary material culture can be claimed to have been found somewhat comprehensively enough for at least one District in Madras State, it is admitted that the last word, and even any positive word, about their chronology or whence the megalithic folk or influence came has still to be said.[1]

[1] For my initiation into the subject of megaliths I am deeply indebted to Shri V. D. Krishnaswami, Superintendent, Department of Archaeology, Southern Circle, Madras.

ANIMAL-FOSSILS AND PALAEOLITHIC INDUSTRIES FROM THE PRAVARA BASIN AT NEVASA, DISTRICT AHMADNAGAR

By H. D. Sankalia

CONTENTS

1. INTRODUCTION

IT was in 1930 that Cammiade and Burkitt, for the first time, brought to our notice an Upper Palaeolithic element in the Stone Age industries of India, while describing the finds from south-east India.[1] This discovery was followed by that of Todd in the west coast, near Bombay.[2] Passing reference has also been made to a flake- and

[1] L. A. Cammiade and M. C. Burkitt, 'Fresh light on the Stone Ages in south-east Asia', *Antiquity*, 1930, pp. 327-39.

[2] K. R. U. Todd, 'Palaeolithic industries of Bombay', *Jour. Roy. Anthropological Inst. Great Britain and Ireland*, LXIX (1939), pp. 257-72.

blade-assemblage from central India,[1] but its character is not known. Recently Krishnaswami and Soundara Rajan have reported similar discoveries in the Singrauli basin near Mirzapur in northern slopes of the Vindhyas.[2]

The object of this paper is to announce a similar succession of lithic tool industries, with an indication of probable climatic changes, in northern Deccan.

Nevasa (19° 30′ N. Lat. and 74° 50′ E. Long.) is a small town situated on either bank of the Pravara river, a tributary of the Godavari, in Ahmadnagar District, Bombay State (fig. 1). Last season, the Deccan College Research Institute, under the auspices of the University of Poona, conducted excavations in the chalcolithic mound overlooking the river.

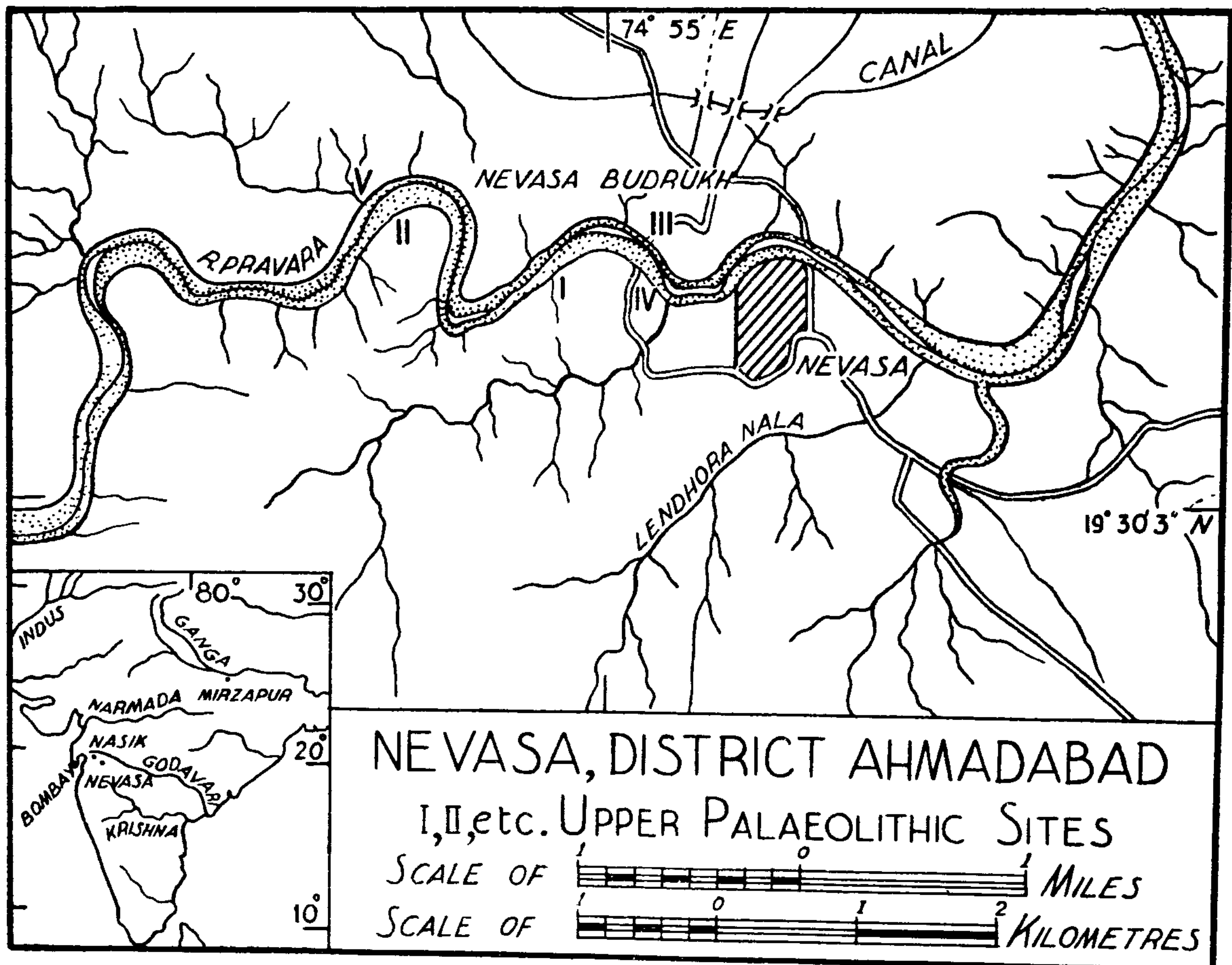


FIG. 1

[1] H. De Terra and T. T. Paterson, *Studies on the Ice Age and Associated Human Cultures* (Washington, 1939), p. 320, had also reported the discovery of a flake- and blade-industry from the basal gravel of the new alluvium and *regur* clay of the Narmada in central India. They, however, thought that the industry belonged to relatively recent times, and hence did not describe or illustrate it. We had an opportunity to work in the adjacent area, at Maheshwar, and found that 10-ft. thick deposits of a chalcolithic culture rested on the surface of the *regur* or black soil. In fact, the stratigraphical sequence of cultures at Maheshwar and Nevasa is identical. It would, therefore, appear that the flake- and blade-industry of the Narmada is not so late. We found a large number of scrapers of jasper in the *regur* and a few flakes and cores in the uppermost gravel beds but no blades.

[2] V. D. Krishnaswami and K. V. Soundara Rajan, 'The lithic tool-industries of the Singrauli basin, District Mirzapur', *Ancient India*, no. 7 (1951), pp. 40-65.

While doing so, it carried out a systematic survey of the river in its vicinity, in search of palaeolithic tools and the associated fossil and human remains.

No palaeolithic tools of any kind were reported from this river-basin before, though the writer had found in the Godavari and its other tributary in the adjoining District of Nasik, some ten years ago, microlith-like flakes and blades at Nandur-Madhmeshwar on the Godavari, about 64 miles to the north-west of the present area.[1] Zeuner had also briefly inspected this site in 1949,[2] though not many tools were found then. However, during our work at Nasik and its surroundings in 1951, genuine palaeoliths were discovered.[3] This gave us hope of similar discoveries in the Pravara basin.

During our preliminary surveys in this basin, nothing truly palaeolithic was found, but we noticed that the drier part of the present river-bed was full of small flakes, blades and scrapers of agate, jasper and chalcedony. Since these did not occur in stratified deposits, it was difficult to have an idea of their age. The credit of discovering such a deposit, which led to a subsequent scientific investigation, goes to Shrimati Sarla H. Sankalia. During this work, accomplished with the help of Dr. R. V. Joshi, my former pupil and now Reader in Geology in the Karnatak University, and Shaikh Zainuddin Ansari, to whom are also due all the drawings and photographs reproduced here, the gravel-layers were minutely searched and carefully mapped for a distance of nearly 2 miles west of Nevasa and a small section of it partly excavated. It was during this search that five animal-fossils were found, four by Shaikh and one by Sarla Sankalia.

2. THE GEOLOGY OF THE LAND

The geology of the area is quite simple. It forms a part of the basaltic Deccan 'trap' formation, which constitutes a considerable part of central and peninsular India. The age of this formation is believed to be Upper Cretaceous or Early Eocene. The first rivers—the Godavari and its tributaries—rising in several spurs of the Western Ghats and going eastwards, flowed over this basal basaltic bed. The climate then was probably of a pluvial type, so that the river carried large pebbles of the parent-rock as well as of the veins of chert, jasper etc., formed in it. Such a climate would also favour the existence of animals like *Elephas namadicus* and hippopotamus, remains of which were found in the cemented gravels of the Godavari. Gradually, however, drier conditions seem to have prevailed, so that the river went on raising its bed, first with coarse and then with finer gravel and sand. Possibly this process was not continuous or took place over the whole length of the river, for, at places, the gravels are intercalated with clayey beds. And it is these which help us in distinguishing the various gravel-layers (figs. 2 and 3). A complete break with these climatic conditions is suggested by the thick layer of brownish sandy silt, which lies between the top of these gravels and the surface-layer of black or brown soil. While the latter indicates the existence of humid conditions and vegetation, the exact significance of the formation of the brownish sandy silt is not known.[4] Zeuner regarded it as loessic silt. Anyway, a succession of dry and wet phases is suggested.

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[1] H. D. Sankalia, 'Studies in Prehistory of the Deccan (Maharashtra)', *Bull. Deccan Coll. Res. Ins.*, IV (1942-43), pp. 186 ff. and VI (1944-45), pp. 131 ff.

[2] F. E. Zeuner, *Stone Age and Pleistocene Chronology in Gujarat* (Poona, 1950).

[3] H. D. Sankalia, *The Godavari Palaeolithic Industry* (Poona, 1952).

[4] Dr. R. V. Joshi is at present studying the soil-samples. It is possible that when his report is ready more light will be thrown on the climatic conditions under which this bed was formed. It is expected then to publish a more exhaustive report on the Nevasa lithic industries.

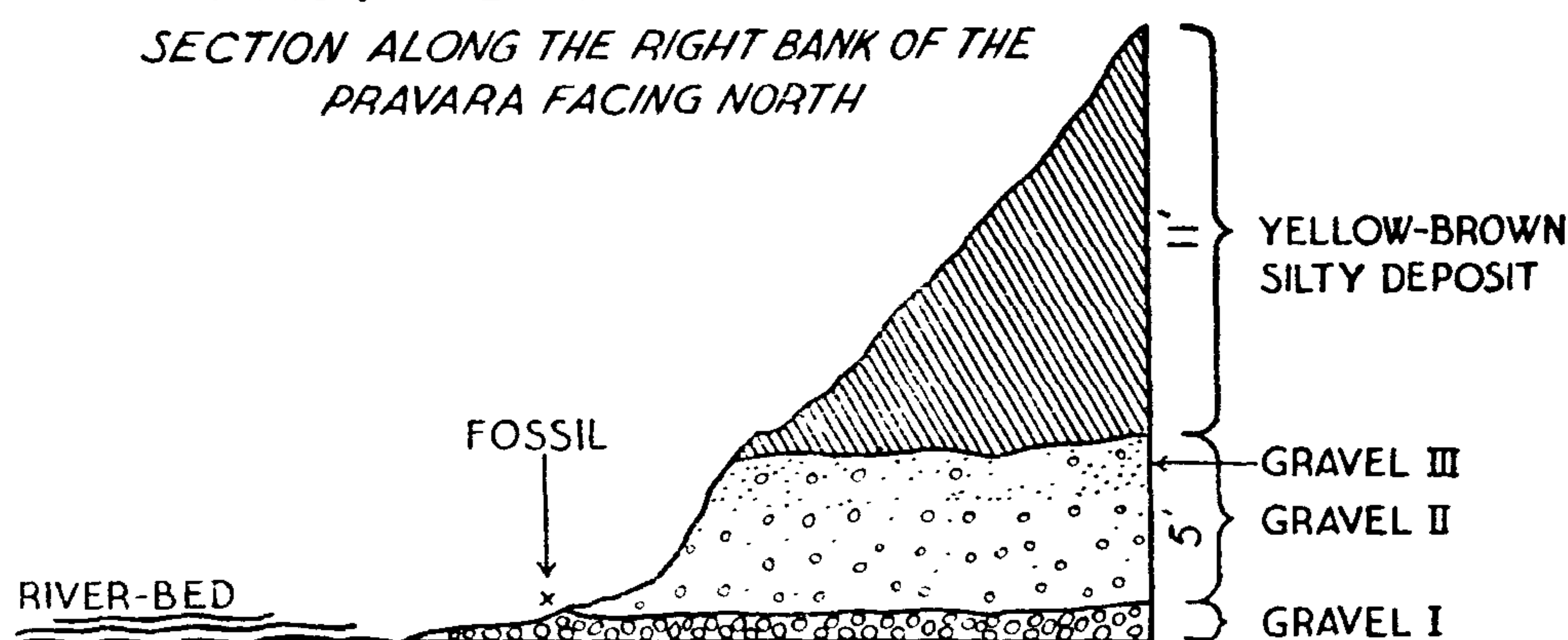


FIG. 2

Zeuner remarks, after observing a similar stratification on the Godavari at Nandur-Madhmeshwar and at Niphad:

'(A) The lower terrace is the youngest cycle, corresponding to period (U) of the Sabarmati and the higher terrace corresponds to the older cycle (R+S of the Sabarmati). The upper cemented gravel is part of the high terrace.

'(B) Exactly as (A), only the upper cemented gravel belongs to a yet earlier cycle of aggradation.

'(C) The lower terrace with its underlying cemented gravel and mottled clay corresponds to the older cycle of the Sabarmati (Q+R+S) and the entire sequence of the higher terrace corresponds to an earlier cycle not represented in the Sabarmati sequence.

'The evidence for wind action is pushed into the background by river action. This is so although a loess-like deposit was found in this area. The conspicuous deposits of wind-blown sand found 250 miles to the north are absent, and the entire sequence has a much more fluviatile aspect.'[1]

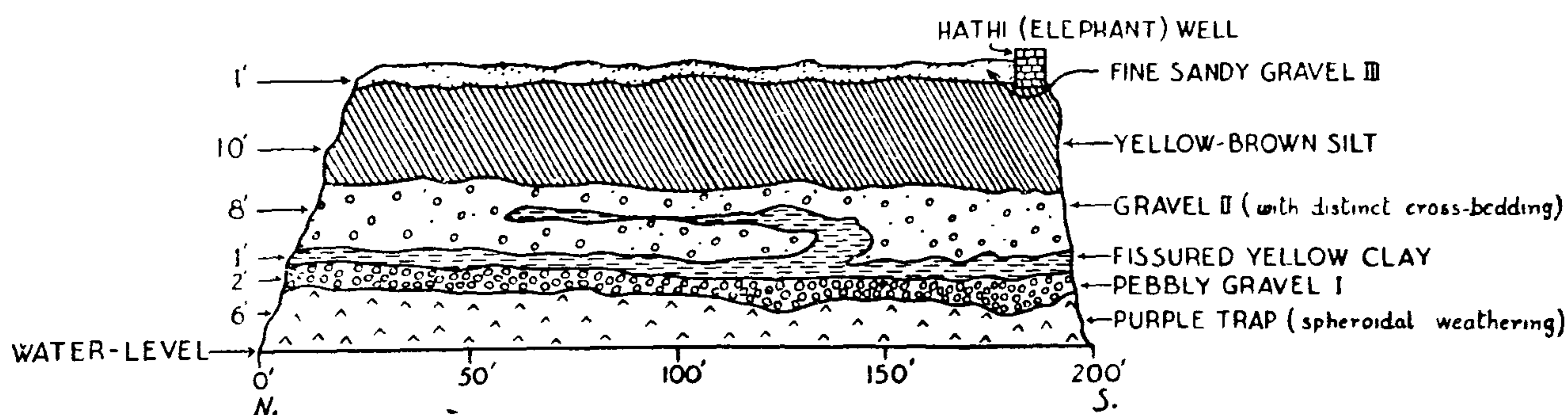
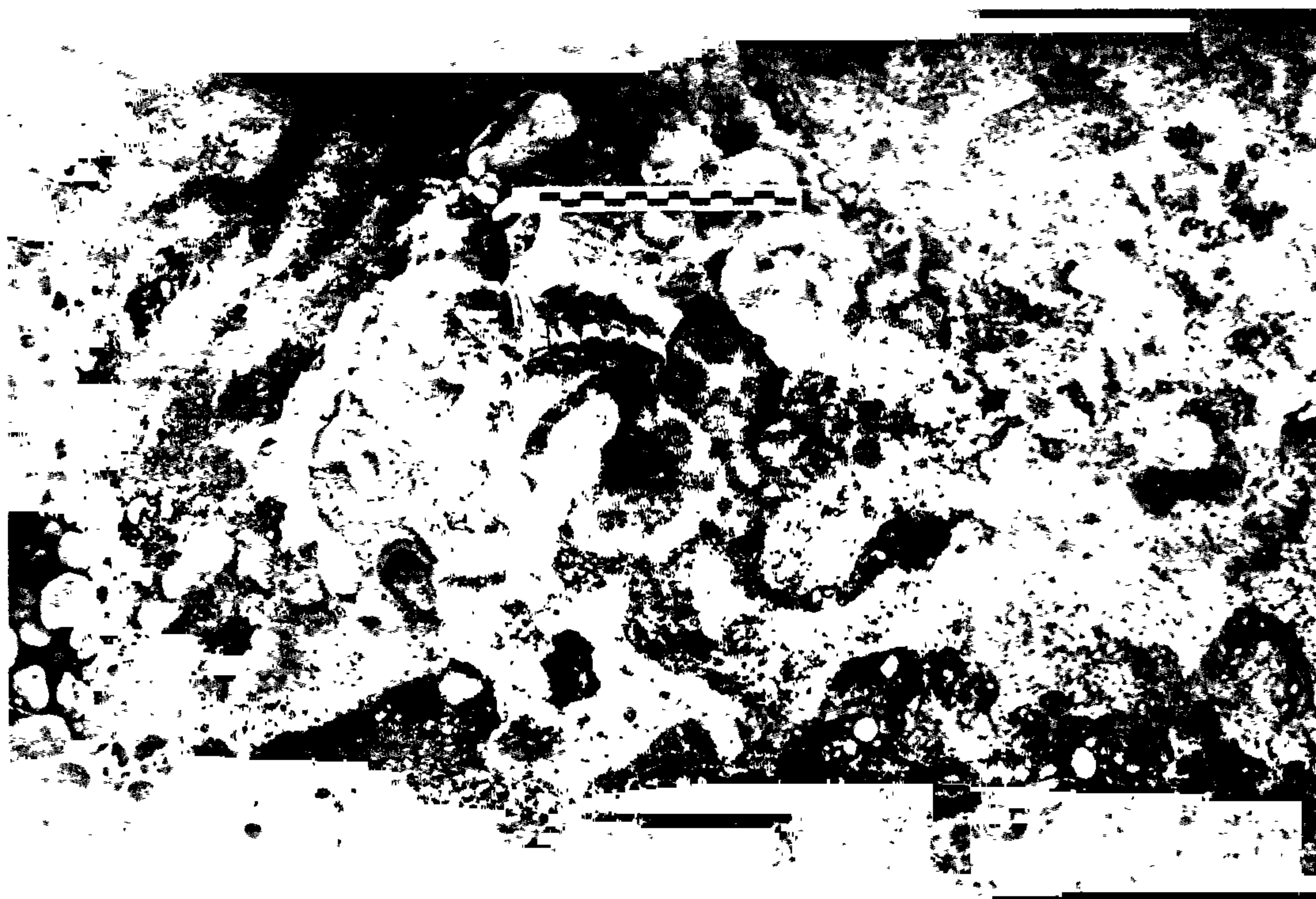
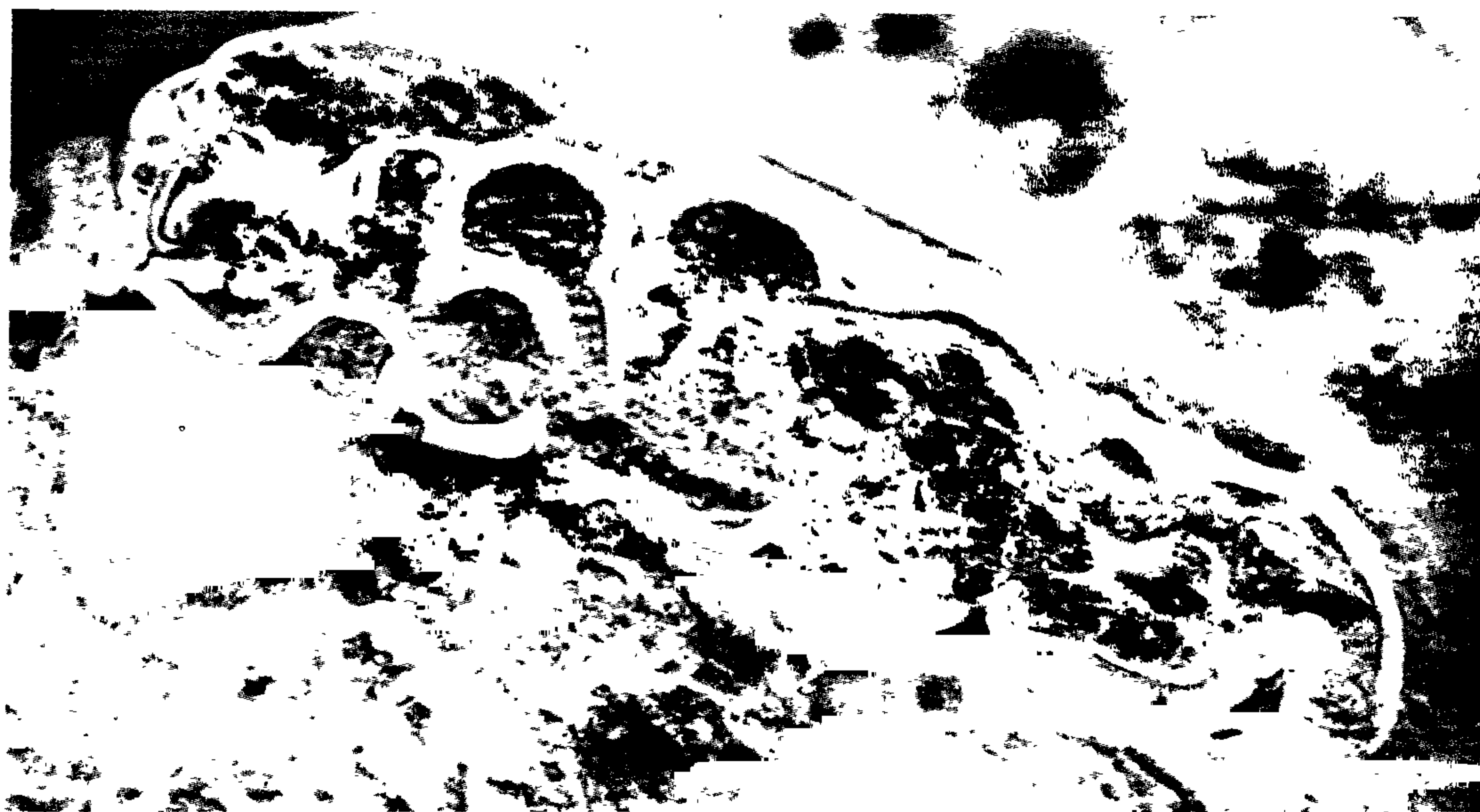


FIG. 3

[1] Zeuner, *op. cit.*, pp. 40-41.



A



B

Nevasa: A, fragmentary mandible of Bos namadicus, and B, its closer view. *See page 39.*
Scale of B, approximately $\frac{2}{1}$

But in view of our observations and the discovery of the *Bos namadicus* in the lowermost (first) gravel-bed, as at Nandur-Madhmeshwar by Pilgrim in 1904,[1] it may now be accepted that the sequence of deposits was as has been postulated here, and not the other way, as alternatively held by Zeuner. It is probable, however, that there were two successive cycles of increasing aridity as Zeuner interpretes the various gravel-deposits.

Each one of the fossils was more or less mineralized. One specimen, found by Shaikh in the hard cemented basal gravel, was a fragmentary mandible of *Bos namadicus* (pl. XIII), according to the identification kindly and very expeditiously made by the Geological Survey of India, Calcutta. There was another mandible of a similar but younger animal. This, however, also resembled that of *Bos indicus*. Of the remaining three specimens, two were the distal end of the humerus and the proximal end of the femur of a bovid, probably *Bos*. The third was a part of the pelvic girdle of a bovid.

3. THE INDUSTRIES

A. Stratigraphy

Though the fossil-material is not quite sufficient to date the Pravara older alluvium conclusively, it should be noted that this is the first time that lithic industries have been found in direct association with animal-fossils outside the Narmada basin. They complement each other, and their combined evidence does not go against that known from the Narmada. Thus, the stratified mandible of *Bos namadicus*, on the Narmada data, could be of the Middle Pleistocene age, whereas the same age is also indicated by the handaxe-cleaver industry, which is typologically Late Abbevillean and Early-Middle Acheulian.

But this is not the only important feature of the Pravara material. The most interesting thing, which was partly observed by us at Maheshwar on the Narmada, is that the middle and upper gravel-beds (nos. II and III respectively from the bottom upwards) contain an altogether different industry. It is different not only in size and technique but also in the quality of the material used. The former, called here Series I, is on trap and dolerite, while the latter, Series II, uses agate, chert, chalcedony and jasper and comprises several kinds of scrapers, blades, cores, burins and points. It must be, however, noted that the handaxes do not completely vanish from the later layers. One large handaxe of green chalcedony with a pebble butt was found in the excavated gravel (middle) (fig. 4, *550*), while a beautiful pointed pyriform handaxe on trap was found at the junction of the uppermost gravel and the brownish silty sand lying above it (fig. 4, *1*). Only one side of it is partly blunted and smoothed by rolling, but the other is as fresh as it could be. This handaxe is in the best tradition of the Acheulian, not only of Gujarat, Karnatak, Madras, U.P.[2] and Panjab, but also of western Europe.

The stratigraphical position of this handaxe as well as its condition helps to remove the doubt that the Nevasa gravels are not in their original position and are reconstituted, so that we find both the industries—an earlier palaeolithic and a later palaeolithic or sub-recent—in the gravels. For, otherwise, this as well as the other handaxe would not have been found in a mint-condition. If the gravels had been reconstituted, the tools should

[1] For details, see Sankalia, *Studies in the Prehistory of the Deccan (Maharashtra)*.

[2] Cf. Krishnaswami and Soundara Rajan, *op. cit.*, p. 54, no. 46.

have been considerably abraded. On the contrary, very few tools—either of Series I or II—are rolled.

The possibility of intrusion, i.e. the coming down of the tools of Series II from the upper layers—of blackish-brownish soil—is also ruled out. For, in this region, unlike that of the Narmada in central India, no tools of this nature are found in the brownish-black soil. This contains, as revealed by surface-explorations, as well as by excavations at Nasik, Jorwe and Nevasa, a developed blade-industry of chalcedony. On the other hand, the thick layer of reddish-brown silty sand overlying the uppermost gravel, as in the Narmada and also in Gujarat, is devoid of any tools whatsoever.

Thus, the negative as well as the positive evidence would suggest that in this area we have to deal with two tool-making traditions—an earlier (handaxe-cleaver) tradition and a later (flake- and blade-) tradition—which flourished side by side for some time, though gradually the latter seems to have ousted the former.

Having indicated the stratigraphical position of the industries, their main types are mentioned and the more important of the individual tools described below in detail.

B. Tools of Series I

These were found in Localities I, II and V. Specimens found *in situ* came from Gravel-beds I, II and III, while those collected from the surface were found lying on the talus near Gravel-bed I in Locality V and very probably belonged to it.

(i) *Handaxes* (fig. 4)

(a) Pebble-butted pear-shaped handaxe: thin tongue-like point; thick rounded butt; large and deep flake-scars; uneven but sharp edge. Fresh green chalcedony.

Reg. no. 550.[1] Locality I, Gravel-bed II, from the excavated gravel, about 8 ft. above the top of cemented Gravel-bed I.

(b) Pyriform or fish-like handaxe: fully flaked on both sides by fine 'step'-technique and subsequent retouch along the edge, leaving the central, flat, tabular patch of original cortex on either side; one surface quite fresh, as if in a mint-condition, and a half of the other, which was exposed, weathered and with effaced flake-scars.

Reg. no. 1. Locality I, at the junction of the loose coarse Gravel-bed III and upper reddish silt, *in situ.*

(ii) *Cleavers* (fig. 5)

Except one, all the rest (eleven) are on side-flakes. While the majority seem to be chipped on the Clactonian technique, reg. no. 29 shows the 'Victoria West', and reg. no. 27 'step'-technique on the edges. The sections are mainly of three types: convex, triangular and parallelogrammatic. On the basis of general form—the shape of the edge and butt—all the cleavers fall into the following types, of which (e) and (g) seem to be quite new.

[1] The tools the reg. nos. of which are in italics are illustrated.

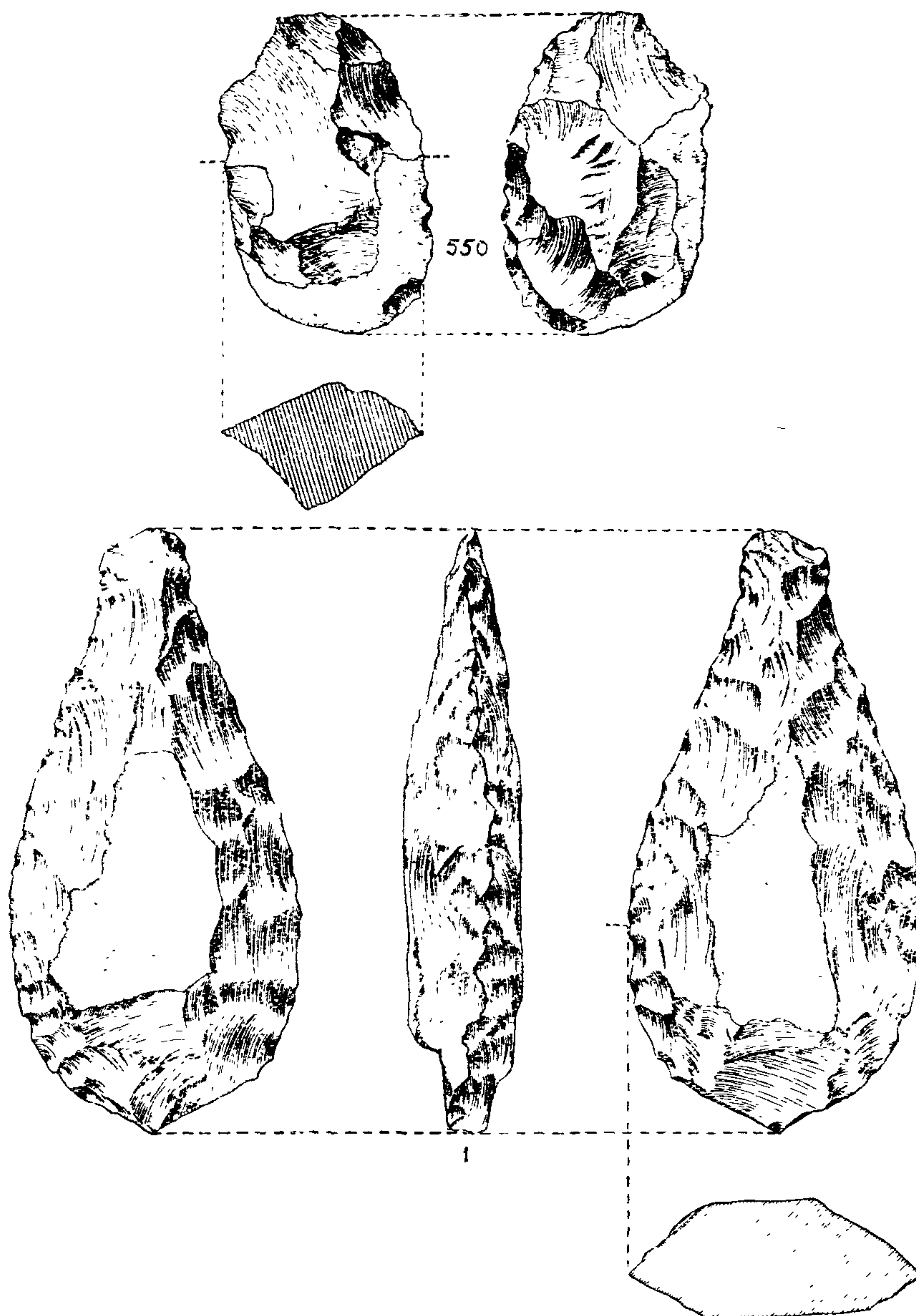


FIG. 4. *Tools of Series I: handaxes.* $\frac{1}{3}$

(a) Oblique edge and pointed butt.
Reg. no. 7. Locality V, Gravel-bed I, *in situ.*
Reg. nos. 10 and 12. Locality V, surface.
Reg. no. 29. Locality I, top of Gravel-bed I.

(b) Oblique wavy edge and broad bevelled butt.
Reg. no. 11. Locality V, Gravel-bed I, *in situ.*

(c) Straight or almost straight edge, with thick heavy rectangular butt.
Reg. no. 9. Locality V, surface.

(d) Straight edge with thick heavy angular butt.
Reg. no. 5. Locality V, surface.

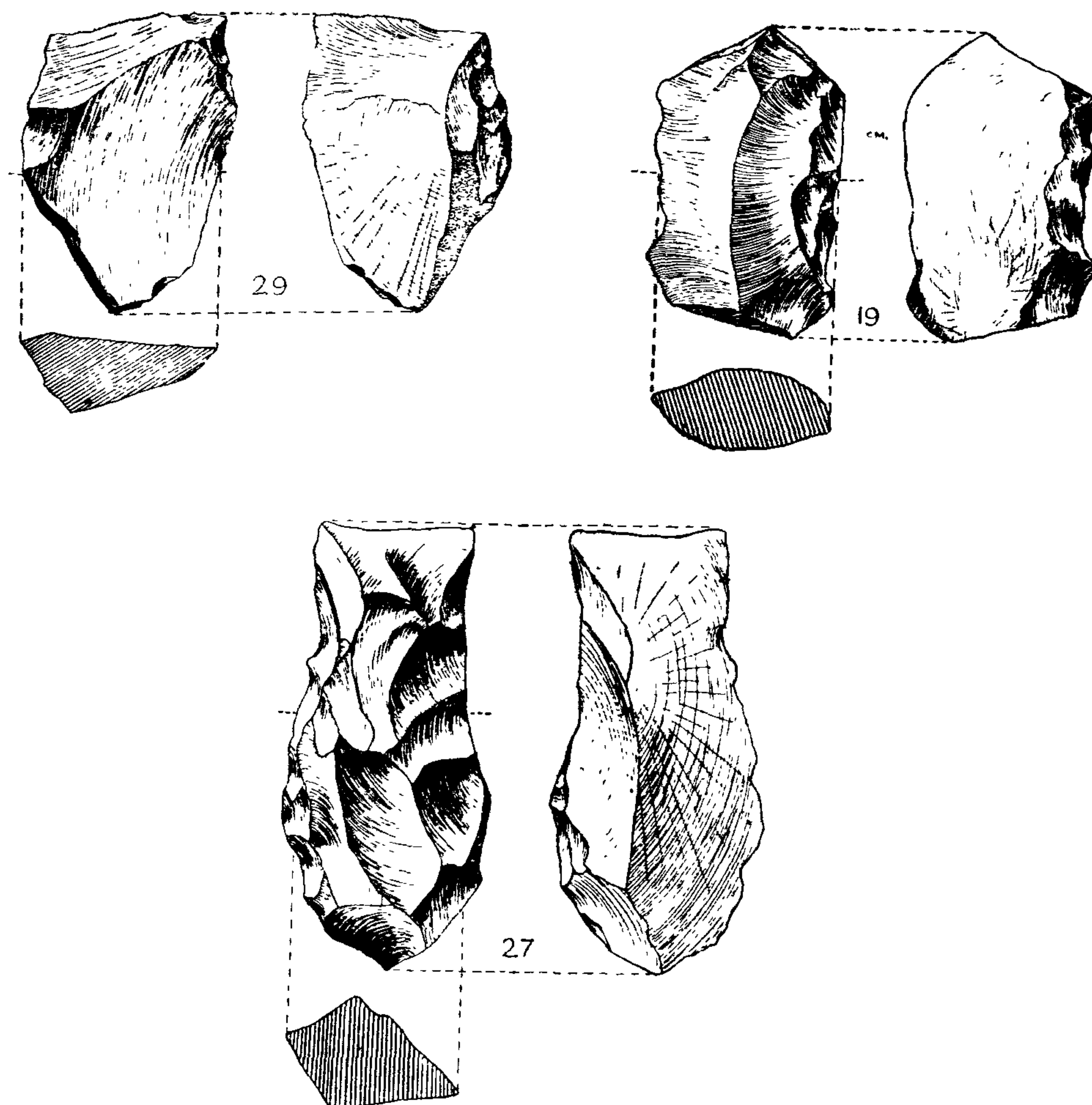


FIG. 5. *Tools of Series I: cleavers.* $\frac{1}{3}$

(e) Cleaver-*cum*-handaxe: small straight edge, on an elongated body having a comparatively narrow front, and slightly broad and rounded towards the butt, which meets in a point; a part of the underside as well as the whole of the upper body is marked by 'free' flaking, while the edge bears a few 'step'-scars; slightly rolled.

Reg. no. 27. Locality V, top of Gravel-bed I, *in situ.*

(f) Broad convex edge with pointed butt.

Reg. no. 13. Locality V, Gravel-bed I, *in situ.*

(g) Pointed angular edge and pointed or thick rounded butt.

Reg. no. 3. Locality V, surface.

Reg. no. 19. Locality V, surface.

(iii) *Flakes*

(a) Flakes with pointed end and thicish butt, havking a clean undersurface but partly worked on the upper surface.

Reg. nos. 7 and 14. Locality V, Gravel-bed I, *in situ.*

(b) Rectangular flake, with clean undersurface but worked on the upper surface.

Reg. no. 15. Locality V, Gravel-bed I, *in situ.*

(iv) *Discoid*

Only one discoid was found: this is on a roundish pebble, almost one-half of which has been flaked by 'step'-technique so as to yield a sharp wavy edge along half the periphery of the pebble.

Reg. no. 28. Locality V, surface.

(v) *Cores or hammer-stones* (fig. 6)

(a) Whereas the tool described above is definitely a discoid, there are five others, one found *in situ* in Gravel-bed I and four lying loose immediately below it on the talus, which may be described as fully-worked cores, with a round or semi-circular cross-section. But besides these have a small flattish surface, flaked or unflaked at one end, whereas on the opposite end there is a conical blunt point, with sinuous 'equitorial jagged' edge, due to alternate flaking, partly 'free' and partly 'step'. This suggests that one of the main functions of these tools was striking, as with a hammer. These could also be described as 'chopping tools' of Movius. Those found loose are slightly rolled.

Reg. no. 2. Locality V, surface.
Reg. no. 4. Locality V, surface.
Reg. no. 4a. Locality V, surface.
Reg. no. 16. Locality V, surface.
Reg. no. 17. Locality V, surface.

(b) One tool requires a separate mention, because, unlike others, it is of bloodstone (heliotrope) and not trap and is in a mint-condition. So it would appear that it should belong to Gravel-bed II or III, but in its careful preparation by 'free' and 'controlled' flaking it resembles the cores on trap. However, it is also possible that it truly belongs to the later gravel-beds.

Reg. no. 450. Locality I, Gravel-bed I, surface.

(c) This tool, found *in situ*, is small and may not be a hammer-stone but only a core. It has no doubt a flat unflaked surface, but there is no point.

Reg. no. 232a. Locality V, Gravel-bed I, *in situ.*

(d) Large core-flake (chopping tool?) with deep Clactonian flake-scars.

Reg. no. 13. Locality V, surface.

(vi) *Tabular handaxe on core* (fig. 7)

This also is a novel kind of tool. Thick and rectangular, it has thick deeply-flaked sides and undersurface and a broad axe-like edge, formed by the almost perpendicular slope of the undersurface meeting the upper surface. The butt-end is fully worked by 'free' flaking and ends in a small point. Thus, this piece is worked on four sides, one end of which is pointed and another has a broad edge, and the surfaces are flattish.

Reg. no. 34. Locality I, Gravel-bed I, *in situ.*

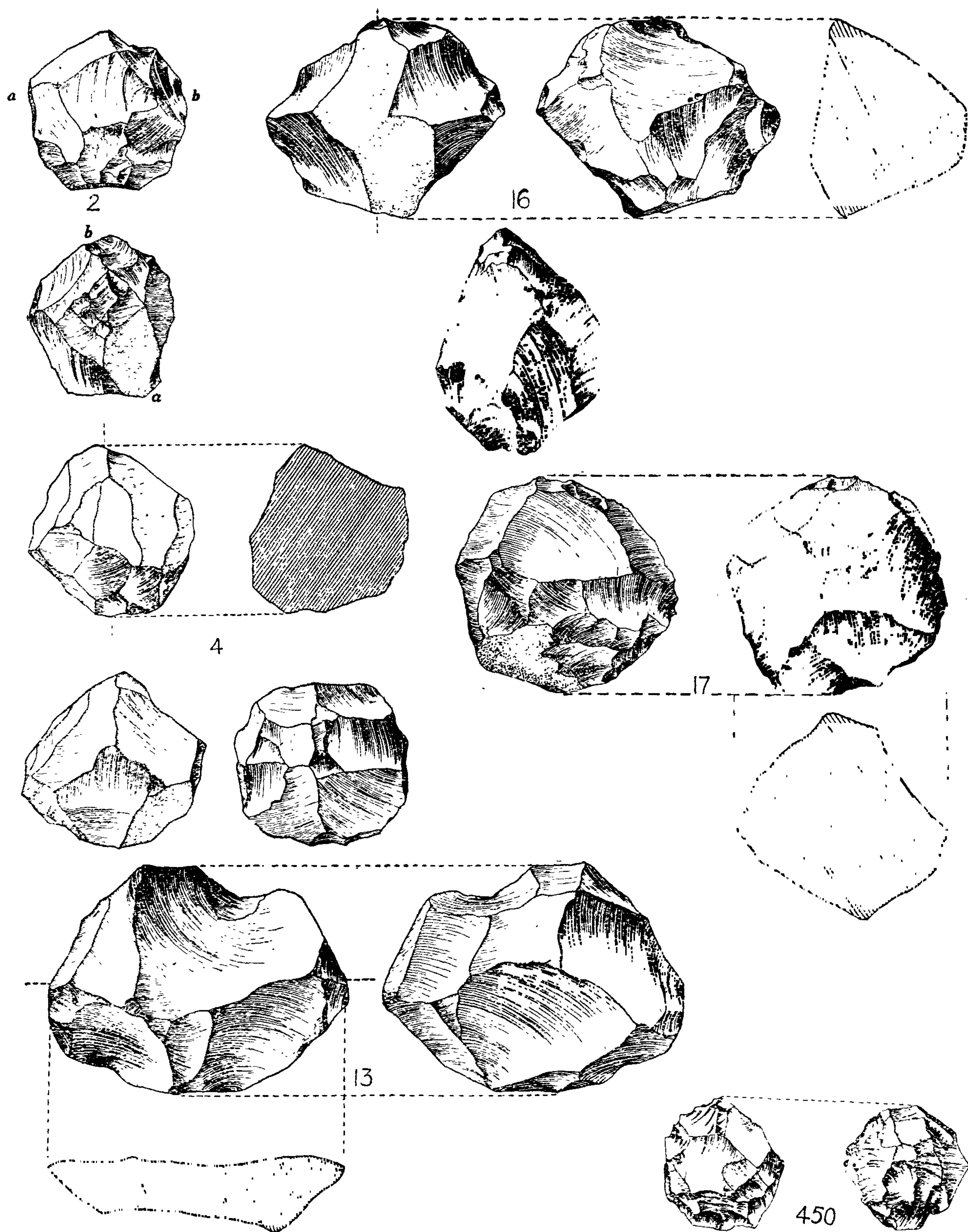


Fig. 6. *Tools of Series I: cores or hammer-stones.* 13 and 450, $\frac{1}{3}$; rest, $\frac{1}{6}$

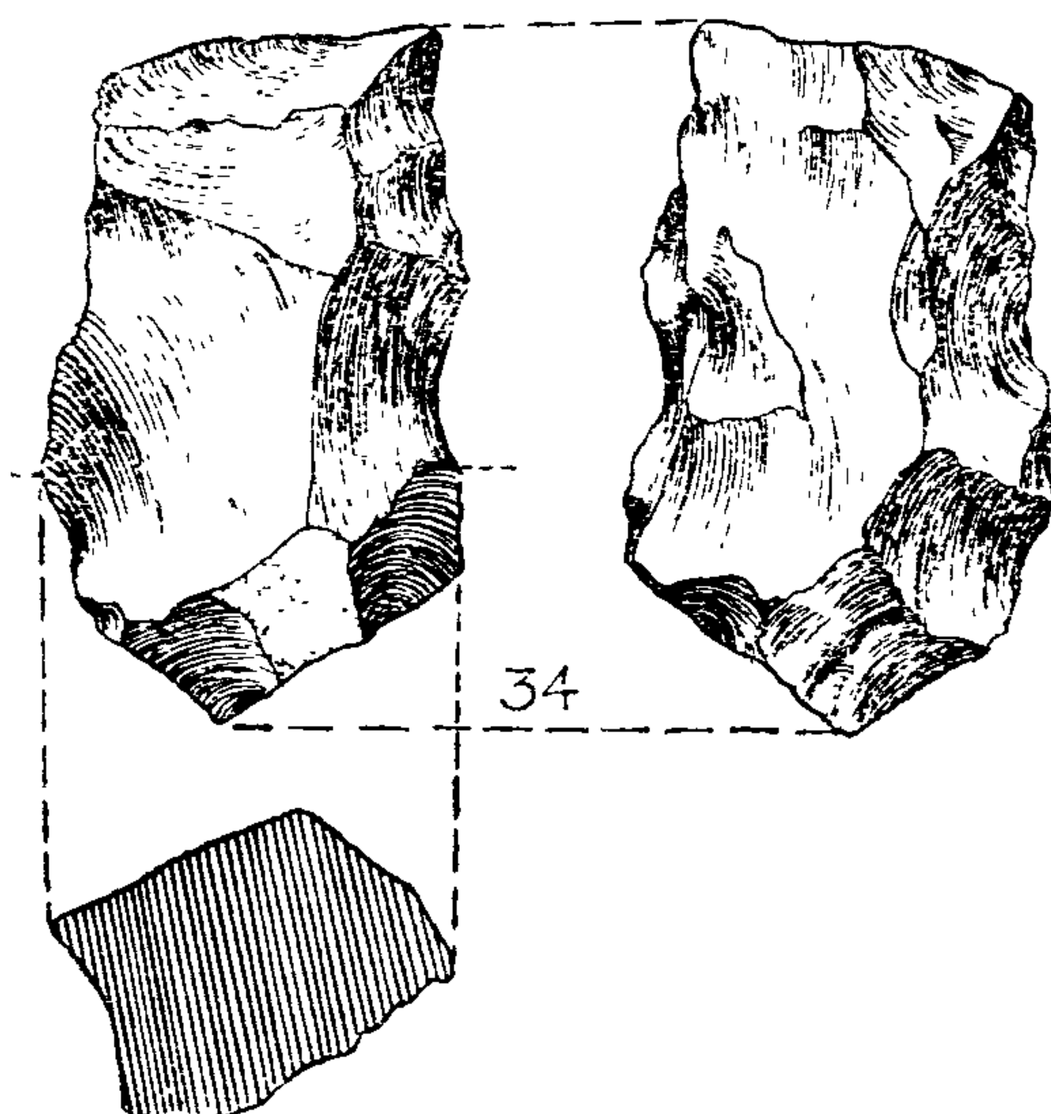


FIG. 7. *Tool of Series I: tabular handaxe on core.* ½

C. TOOLS OF SERIES II

Tools of Series II were collected from Localities I, II, III, IV and V and were found *in situ* in Gravel-bed I, II or III. A much larger collection was made from the loose gravel in the present river-bed. In all two hundred and fiftyeight specimens have been studied. For the proportions of the types, please see Appendix (p. 52).

The tools may be grouped into the following types:

(i) *Flakes* (fig. 8)

Flakes with bulb and prepared striking platform, clean primary undersurface, upper surface worked or unworked.

Reg. nos. 533 and 545. Chalcedony. Locality V, Gravel-bed I.
Reg. no. 511. Trap. Slightly rolled. Locality I, Gravel-bed II.
Reg. no. 512. Trap. Slightly rolled. Locality I, Gravel-bed II.
Reg. no. 562. Chalcedony. Locality I, Gravel-bed II.
Reg. no. 502. Chalcedony. Locality V, Gravel-bed III.
Reg. no. 551. Chert. Locality I, Gravel-bed III.

(ii) *Cores* (fig. 8)

(a) Core (Clactonian) with deep flake-scars on one side and a flattish unworked base.

Reg. no. 528. Mottled greenish chert. Locality V, Gravel-bed I.
Reg. no. 558. Mottled greenish chert. Locality I, Gravel-bed I.

(b) Core worked on both sides, with deep flake-scars.

Reg. no. 513. Chalcedony. Locality I, Gravel-bed II.
Reg. no. 575. Chert. Locality I, Gravel-bed II.
Reg. no. 523. Chert. Locality III, Gravel-bed II.

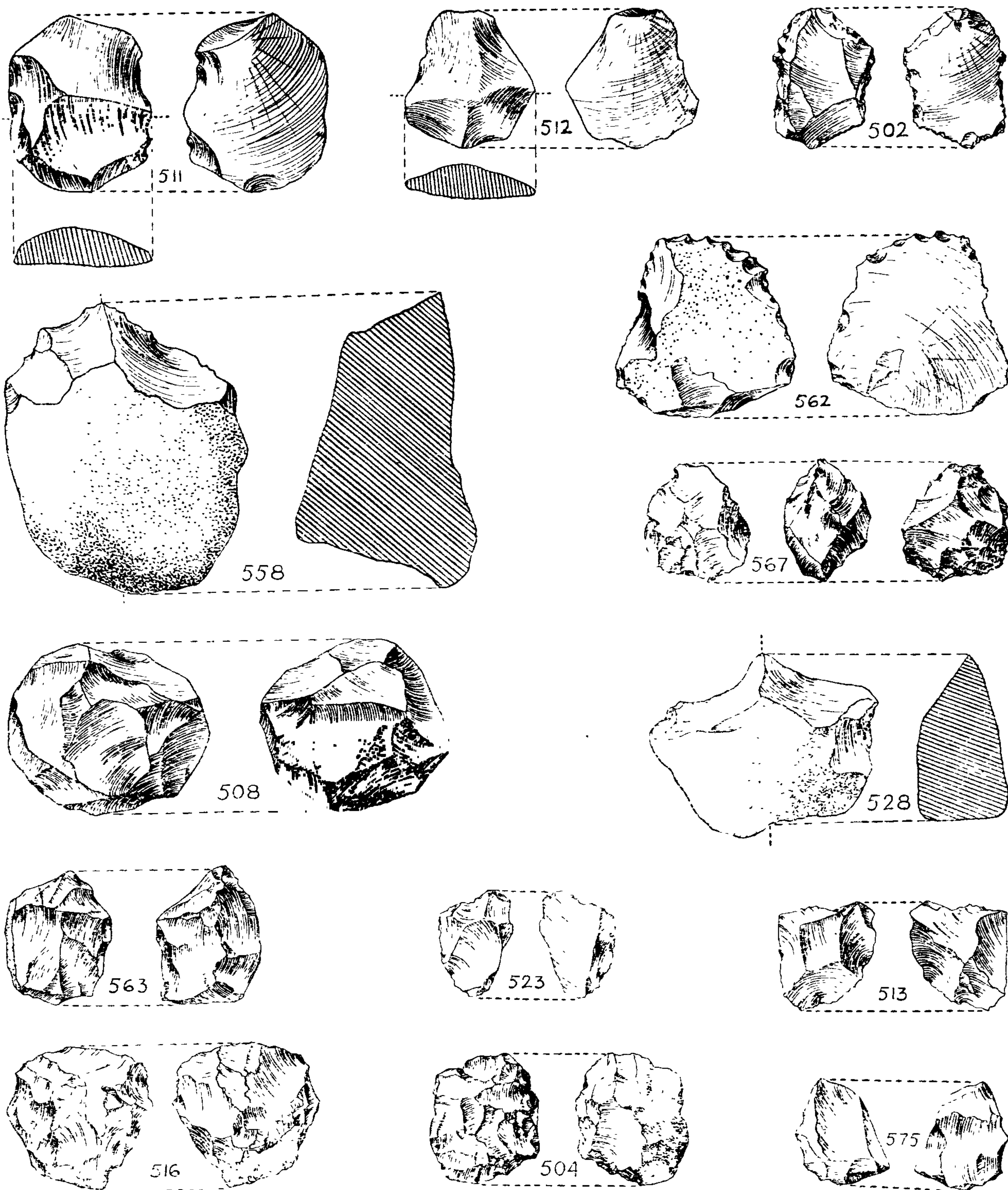


FIG. 8. *Tools of Series II: 502, 511, 512 and 562, flakes; rest, cores.* $\frac{1}{2}$

(c) Discoids worked all over by pressure-technique with an irregular wavy edge.

Reg. no. 504. Chalcedony. Locality V, Gravel-bed III.
Reg. no. 516. Chalcedony. Locality III. Gravel-bed II.
Reg. no. 563. Mottled chert. Locality I, Gravel-bed II.
Reg. no. 567. Chalcedony. Locality V, Gravel-bed III.
Reg. no. 508. Greenish chert. Much rolled, perhaps of Series I. Locality I, Gravel-bed II.

(iii) *Blades* (fig. 9)

(a) Blunted back, with edge partly retouched on the underside.

Reg. no. 356. Greenish chalcedony. Slightly rolled and glossy. Locality I, Gravel-bed II, *in situ.*

(b) Narrow worked butt, with retouch partly on the underside and partly all round the upper side.

Reg. no. 232. Mottled chert. Locality II, surface.

(c) Flake-blade, with a small notch and retouch on the edge-side and near the underside of the butt-end.

Reg. no. 570. Chert. Gravel, *in situ.*

(iv) *Scrapers* (fig. 9)

(a) Tabular side-scraper with cortex all over, except on the edge; one side is the result of a single flake-scar, while the other is fairly worked by pressure-technique; straight worked back.

Reg. no. 561. Yellowish chert. Locality I, loosely embedded in Gravel-bed I.

(b) End-scraper, with retouch on either side.

Reg. no. 238. Greenish chalcedony. Locality I, surface.
Reg. no. 468. End-scraper *cum* double-edged blade with upturned front, which is flaked partly on the upper surface as well as on the undersurface. Chalcedony with variegated hues. Locality I, surface.

(c) Steep-ended scraper.

Reg. no. 237. Whitish chalcedony. Locality I, surface.
Reg. no. 21. Red jasper. Locality I, surface.

(d) Hollow scraper, with blunted back, flattish chipped undersurface and retouched edge.

Reg. no. 209. Brownish chert. Locality II, surface.
Reg. no. 315. Greenish chalcedony. Locality I, surface.

(e) Hollow scraper on a flake with retouch all round, except on the bulb and the faceted platform.

Reg. no. 211. Greenstone. Locality I, surface.

(f) Hollow scraper, with retouch on one edge only.

Reg. no. 375. Banded red jasper. Surface.

(g) Hollow double-edged scraper.

Reg. no. 211A. Chert. Locality I, surface.
Reg. no. 554. Chert. Partly patinated. Locality II, Gravel-bed II, *in situ.*

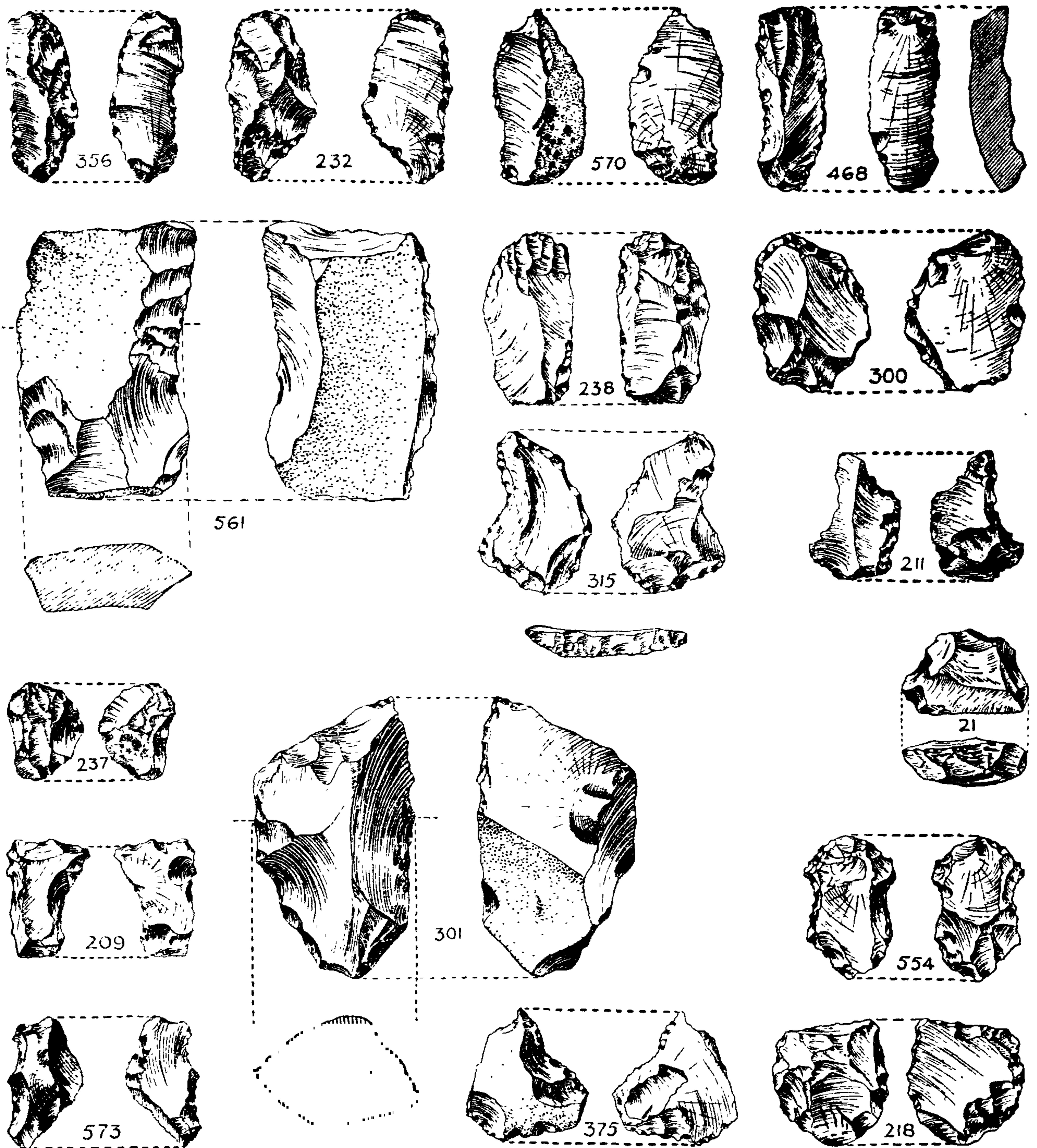


FIG. 9. *Tools of Series II: 232, 356 and 570, blades; rest, scrapers.* 301, $\frac{1}{1}$; rest, $\frac{1}{2}$

(h) Side-scraper, with a part of the underside and the bulb also trimmed.
Reg. no. 573. Banded chert. Locality I, Gravel-bed II, *in situ.*
Reg. no. 300. Chocolate jaspery chert. Surface.
Reg. no. 299. Chocolate banded jaspery chert. Locality I, surface.

(i) Semi-oval scraper, with retouch around.
Reg. no. 218. Greenish chalcedony. Locality I, surface.

(j) Miniature cleaver-like oblique-edged scraper.
Reg. no. 301. Bloodstone (heliotrope). Locality V, surface.

(v) *Burins* (fig. 10)

(a) Burin on a blade, with marginal retouch on the burin-facet as well as on the side opposite it.
Reg. no. 253. Semi-transparent chalcedony. Locality II, surface.

(b) Double-ended burin, having a patch of cortex on the flat underside.
Reg. no. 251. Chocolate chert. Locality I, surface.

(c) Thick rectangular piece, having a chisel-like short broad edge, one side of which is vertically flaked as in a burin.
Reg. no. 530. Chert. Locality V, Gravel-bed I, *in situ.*

(vi) *Tools with points* (fig. 10)

(a) Drill or awl.
Reg. no. 164. Chalcedony. Surface.

(b) Arrow- or spear-head on a fine large flattish triangular flake, with marginal retouch.
Reg. no. 227. Chalcedony. Surface.

(c) Broad projecting point, with oblique retouch on the underside and 'step'-like cuts on the margin of the upper surface.
Reg. no. 74. Brownish chert with glossy surface. Locality I, surface.
Reg. no. 506. Blackish chert. Locality V, Gravel-bed III, *in situ.*
Reg. no. 507. Chalcedony. Locality V, Gravel-bed III, *in situ.*
Reg. no. 545. Greenish quartz. Locality V, Gravel-bed I, *in situ.*
The last two are smaller and more symmetrical.

(d) Thick triangular piece, with an unflaked undersurface and almost fully-flaked upper surface, with a chisel-like edge.
Reg. no. 529. Banded agate. Locality II, Gravel-bed.

(vii) *Levallois flakes* (fig. 10)

A few comparatively thin and symmetrical flakes, with a faceted or simple striking platform, an erased bulb and an angle of 90°, have been found. Some are partly retouched along the edges. They are all from the surface.

Reg. no. 283. Large, thin, leaf-shaped flake, with a shallow flake-scar on the surface, edges partly retouched from the upper surface and undersurface, erased bulb, simple platform and angle of about 90°. Brownish jaspery chert. Locality II, surface.

Reg. no. 374. Large, thin, roundish flake with two flake-scars on the upper surface, finely-faceted platform and partially retouched edges. This flake must have been removed from a tortoise-core. Mottled green-yellowish chert. Locality I, surface.

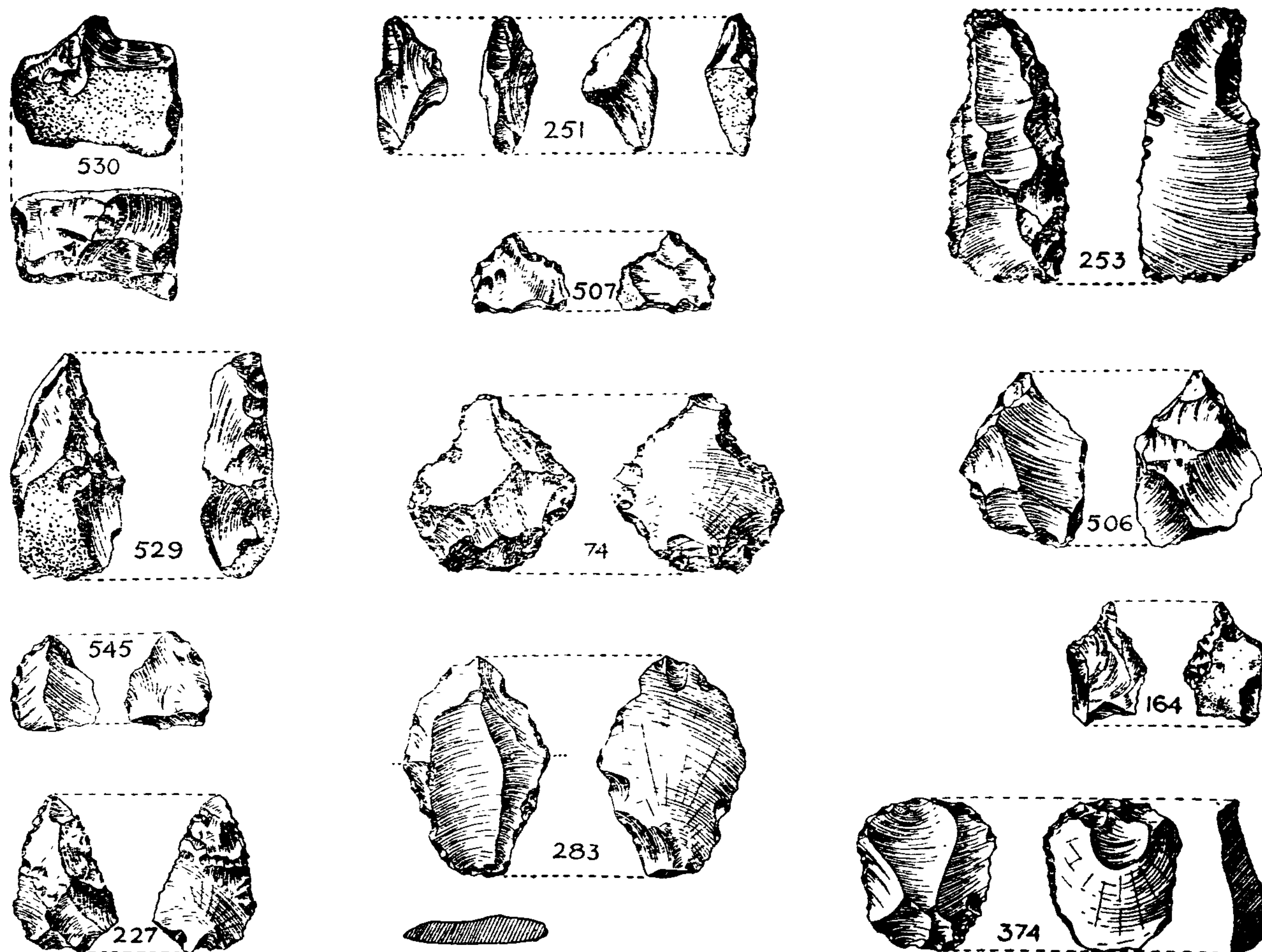


FIG. 10. *Tools of Series II: 251, 253 and 530, burins; 283 and 374, Levallois flakes; rest, tools with points.* 253, $\frac{1}{1}$; rest, $\frac{1}{2}$

(viii) *General observations*

Many of these tools are similar in type and technique, as also in the material, to those previously found by the writer in the gravels at Nandur-Madhmeshwar, which Zeuner describes as 'Pleistocene'.[1] However, neither the writer nor Zeuner could classify the assemblage under a particular industry, because it lacked 'the characteristics of known industries'. The determination of its stratigraphical position, as succeeding the Early Palaeolithic, as well as of its character helps us not only to recognize the true significance of the earlier discoveries but opens up a promising field for further research, for there are extensive deposits of later gravels in the Deccan and elsewhere. A systematic examination of these is likely to give us a proper idea of the Middle or Upper Palaeolithic industries in India.

[1] Zeuner, *op. cit.*, p. 38. V. D. Krishnaswami, *Ancient India*, no. 9, p. 60, while reviewing the progress in prehistory, seems to confuse the true Lower Palaeolithic industry at Nasik on the Godavari with the earlier one found by the writer at Nandur-Madhmeshwar. It was the latter that could not be classified by the writer and Zeuner. But now it can be said that the industry is akin to Series II of Nevasa.

D. Tools of Series III —microliths (fig. 11)

The loose dry gravels of the present river-bed also yield lunates and other varieties of blades. These are, as a rule, of milky or semi-transparent chalcedony. None of these is so far found *in situ* in any of the gravel-beds in the sections observed by us. Since a large number of such blades and flakes is found scattered in the surface—black or brown soil—and also occur in stratified deposits which can be assigned to the chalcolithic period in the Deccan,[1] these microlithic blades from the loose gravels may be regarded as considerably later. Even the burin and large arrow- or spear-head of chalcedony (above, p. 49) might truly go with this microlithic industry. The main types of these blades are briefly described and illustrated.

(a) Gravette-like point, with fine retouch on the back and an elongated point. *Reg. no. 502 A.*

(b) Lunate. *Reg. no. 502 B.*

(c) Scalene triangle, with fine vertical retouch all along the back. *Reg. no. 502 C.*

(d) Large sub-triangular thin flake, with oblique retouch on the straight side and vertical retouch on the angular side. Probably a spear- or arrow-head. *Reg. no. 502 D.*

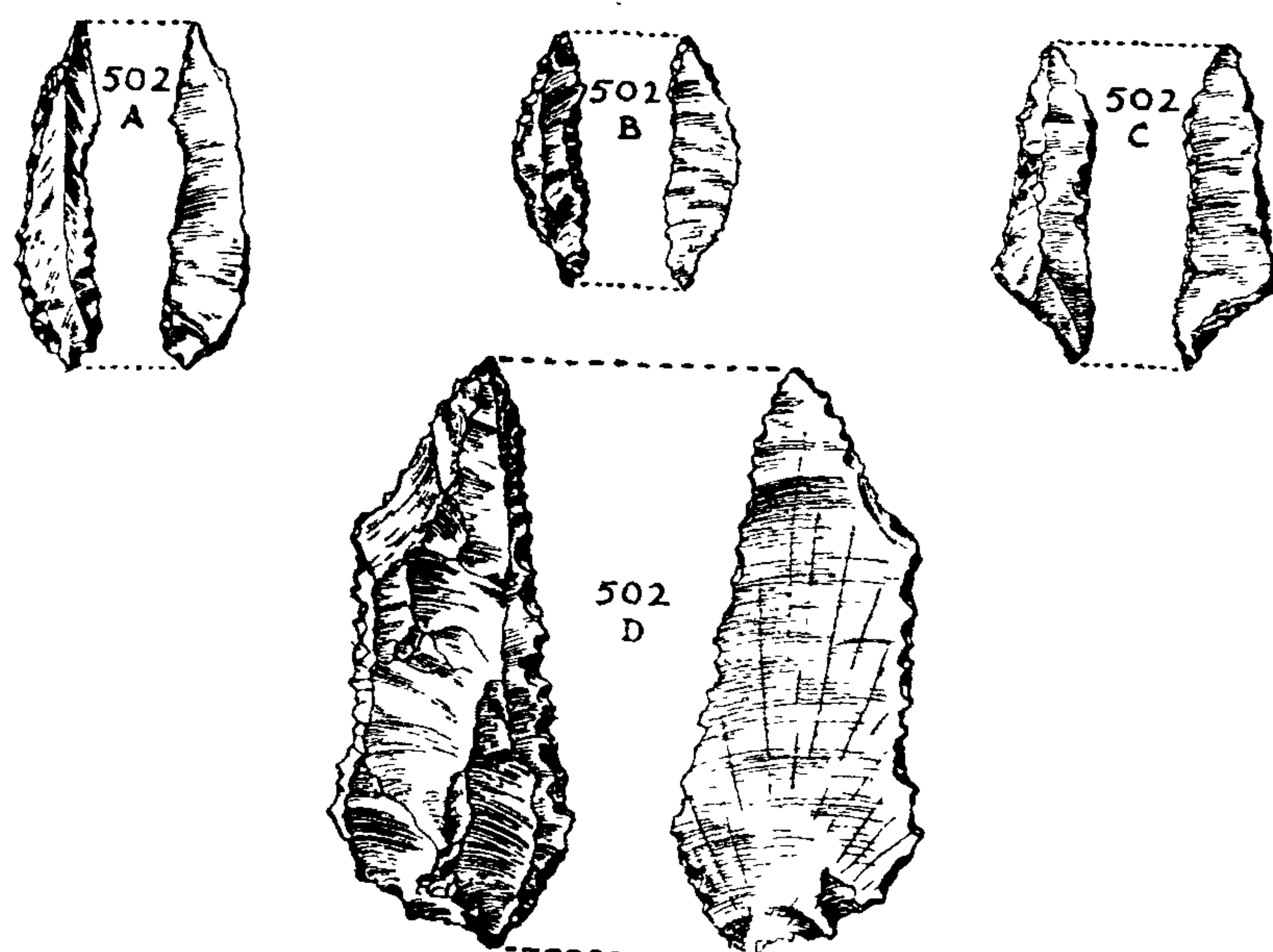


Fig. 11. *Tools of Series III, microliths: 502 A, Gravette-like point; 502 B, lunate; 502 C, scalene triangle; 502 D, sub-triangular thin flake.* $\frac{1}{1}$

4. CONCLUSION

From the above brief details, it would be clear that we have a succession of lithic industries at Nevasa. There is no doubt that the handaxe-cleaver industry was followed by a flake-, blade- and scraper-industry. Whether the latter was followed by a mesolithic industry, or there was a long gap, as suggested by the thick sterile layer of brownish sandy silt, cannot be said for certain. But towards the close of this period, a microlithic industry

[1] H. D. Sankalia and S. B. Deo, *Report on the Excavations at Nasik and Jorwe* (Poona, 1955), pls. XXXI and XXXII.

again flourished in this area and, in fact, all along the middle reaches of the Godavari and its tributaries. From this, and probably due to other cultural intrusions, a short-blade industry developed in the chalcolithic period.

APPENDIX

Statistical analysis of the Nevasa Series II implements[1]

Class	*No. found*	*Approximate percentage in the total no. (258)*[2]	*Sub-class*	*No. of tools in sub-class*	*Approximate percentage in the class*	*Percentage in the total number*
(i) Flakes	50	19·38	...	...	...	...
(ii) Cores	32	12·4	(a)	11	34·4	4·26
			(b)	14	43·7	5·43
			(c)	7	21·9	2·71
(iii) Blades	7	2·71	...	...	...	...
(iv) Scrapers ...	133	51·56	(a)	1	...	...
			(b)	17	12·78	6·6
			(c)	16	12·0	6·2
			(d)	16	12·0	6·2
			(e)	18	13·5	6·98
			(f)	18	13·5	6·98
			(g)	9	6·77	3·49
			(h)	34	25·56	13·18
			(i)	3	2·26	1·16
			(j)	1	...	...
(v) Burins	11	4·26	...	...	...	...
(vi) Tools with points ...	19	7·36	(a)	11	57·9	4·26
			(b)	5	26·31	1·94
			(c)	3	15·79	1·16
(vii) Levallois flakes ...	6	3·32	...	...	...	...

Postscript.—A further survey of the Pravara at Nevasa and elsewhere and of the Godavari at Bel Pandhari, Warkhed and Kalegaon yielded the following tools: *Series I*, eighteen handaxes, twentyfive cleavers, thirtyfour cores, including hammer-stones, and eighteen flakes; *Series II*, numbering one thousand two hundred and thirtyfive tools, of which eight hundred and sixtyfive were finished tools and most of which were found *in situ* in the gravel at Bel Pandhari and Kalegaon. Blades were comparatively few. My pupil, Shri Banerji, is inclined to regard the industry as typologically similar to the Tayacian.

[1] I am thankful to Shri K. D. Banerji, one of my pupils working on the Later Stone Age cultures of central India, the Deccan and Karnatak, for preparing the statistical analysis.

[2] This does not include chips or such other rejected specimens.

AN EXAMINATION OF SOME METAL IMAGES FROM NĀLANDĀ

By Dr. B. B. Lal

CONTENTS

1. INTRODUCTION

NĀLANDĀ was, to use Broadley's words, 'the most magnificent and most celebrated seat of Buddhist learning in the world'.[1] With its traditional origin in the third century B.C. at the time of Aśoka, or even earlier,[2] it gained importance between the fifth and seventh centuries A.D., more accurately during the period intervening between the visits of the Chinese pilgrims Fa-hien (405-11), who saw only a modest establishment here, and Hiuen Tsang (630-45), who admiringly describes the glory of the monasteries at the place, the erudition and renown of its teachers and the disciplined life of its students.[3] Nālandā became the chief centre of the Mahāyāna school of Buddhism, and its influence radiated far and wide.

2. THE BRONZES OF NĀLANDĀ

The ruins of Nālandā, in District Patna, Bihar, have been extensively excavated.[4] Considering the extent of the ruins, the number of stone images unearthed in the excavations is relatively small. The Nālandā artist was evidently a master in modelling small pieces, probably because he was an adept in producing bronzes which could not easily be made in large sizes. Nālandā was a centre of a flourishing metal-industry, and more than five hundred excavated bronze images, mostly of Buddha and Mahāyāna Buddhist deities, ranging in date from the eighth to twelfth centuries, testify to the high technical and metallurgical knowledge which the craftsman had attained in bronze-casting and

[1] A. M. Broadley, *Ruins of the Nālandā Monasteries at Burgaon* (Calcutta, 1872).

[2] F. Anton von Schiefner, *Tāranāthas Geschichte des Buddhismus in Indien* (St. Petersburg, 1869).

[3] J. Legge, *A Record of Buddhist Kingdoms* (Oxford, 1886), p. 81; T. Watters, *On Yuan Chwang's Travels in India* (London, 1904), II, pp. 164 ff.

[4] *An. Rep. Arch. Surv. Ind.*, 1922-23 and subsequent years; A. Ghosh, *Guide to Nālandā*, 3rd. ed. (Delhi, 1946).

metal-working. Artistically, the images show an elegance of form, good proportion and graceful expression (pls. XIV and XV).

The influence of the Nālandā school of bronze sculpture was not confined to the frontiers of India but found its way to the Eastern Archipelago, where a large number of Buddhist bronzes recovered from different sites demonstrate a close stylistic and iconographic affinity to the Nālandā tradition.[1] It is interesting to remark in this connexion that according to Tāranātha, the Tibetan historian of Buddhism of the seventeenth century, Nāgārjuna, the famous Mahāyāna philosopher and alchemist of the second century, lived and studied at Nālandā.

3. INDIAN BRONZES AND THEIR TECHNIQUE

Indian bronzes have a long history behind them, going back to the times of the Harappa culture.[2] Hardly any bronze specimens are available after the disappearance of that culture till we come to the first-second centuries A.D., of which period Taxila has yielded a few specimens;[3] they are not, however, very impressive in finish and workmanship. During the Gupta period metal-casting reached a very high level of technical excellence and metallurgical skill, and life-size images were cast, as is evident from the fifth-century copper image of Buddha from Sultanganj, District Bhagalpur, Bihar, now in the Birmingham Museum.[4]

Contemporaneously with Nālandā, there were other schools in north India where this form of plastic art was practised. Kurkihar, District Gaya, Bihar, has, for example, yielded some two hundred and forty bronzes of the same period and art-tradition as Nālandā.[5] A hoard of Buddhist bronzes, of a somewhat earlier period, has been found at Sirpur, District Raipur, Madhya Pradesh.[6]

South India had a tremendous activity in metal-working during the Choḷa period (ninth-thirteenth centuries), which saw the culmination of the art and produced the finest bronzes of south India. Nagapattinam, District Tanjore, Madras State, has yielded nearly four hundred solid and elegant Buddhist bronzes of great artistic merit.[7] The art continued in south India throughout the succeeding centuries, but the climax of workmanship ended with the Choḷa period.

The traditional method of bronze-casting in India has been the *cire perdue* or 'lost wax' process, wherein the subject is first modelled in wax and then evenly covered with clay; the wax is later removed by melting and into the clay mould thus left is poured molten metal or alloy for casting a solid image. In the case of hollow images, such as were made in Nepal, the subject is first modelled in clay; this core is then evenly coated

[1] E. J. Bernet Kempers, *The Bronzes of Nālandā and Hindu-Javanese Art* (Leiden, 1933).

[2] J. Marshall, *Mohenjo-daro and the Indus Civilization* (London, 1931), I, pp. 44-45; M. S. Vats, *Excavations at Harappā* (Delhi, 1940), I, p. 381. M. Sanaullah, in Vats, *op. cit.*, thinks that the *cire perdue* process was probably unknown to the Harappans, but in view of the available evidence the statement is untenable.

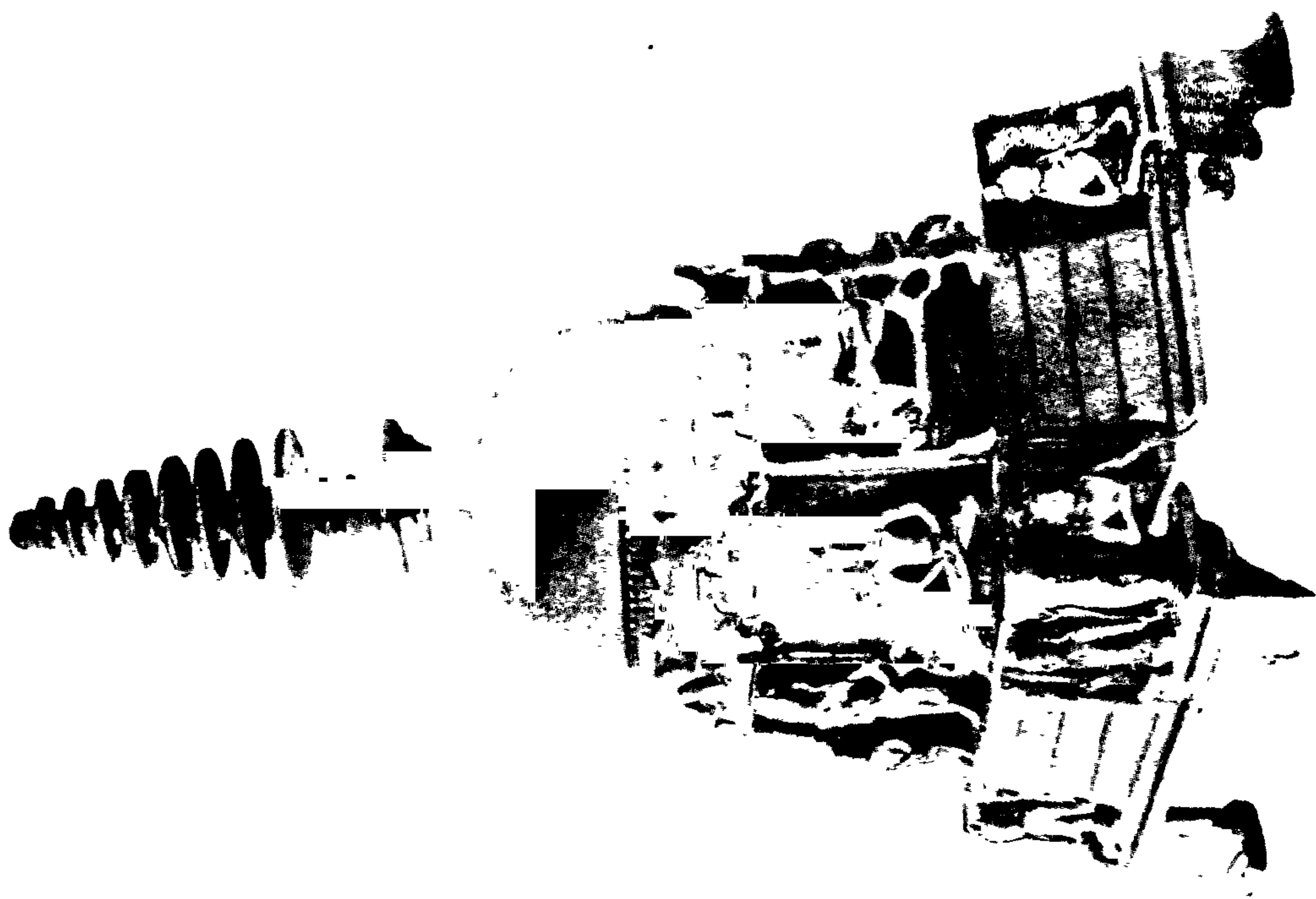
[3] J. Marshall, *Taxila* (Cambridge, 1951), pls. 185-86.

[4] For illustration, see A. Coomaraswamy, *History of Indian and Indonesian Art*, pl. XLI.

[5] Some of the Kurkihar bronzes are described and illustrated by K. P. Jayaswal in *Jour. Ind. Soc. Oriental Art*, II (1934), pp. 70 ff.

[6] *Indian Archaeology* 1954-55—*A Review* (New Delhi, 1955), p. 24.

[7] T. N. Ramachandran, *The Nāgapaṭṭiṇam and other Buddhist Bronzes in the Madras Museum*, Bull. Madras Govt. Mus., N. S., VII, no. 1 (Madras, 1954).

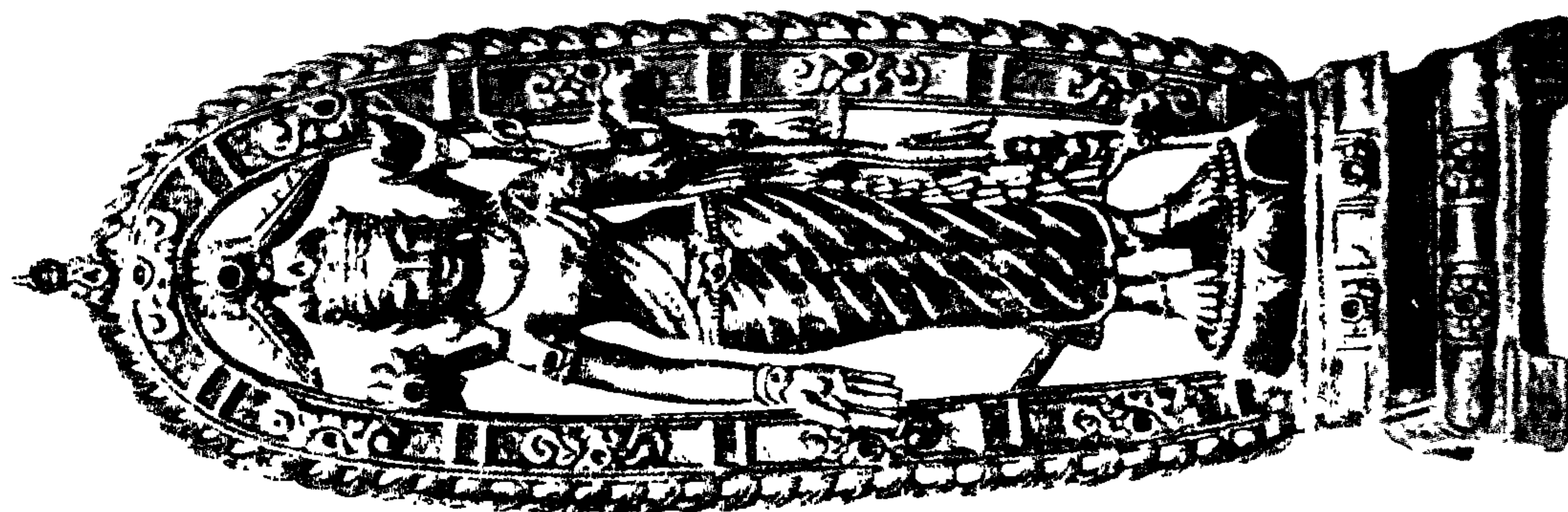


B

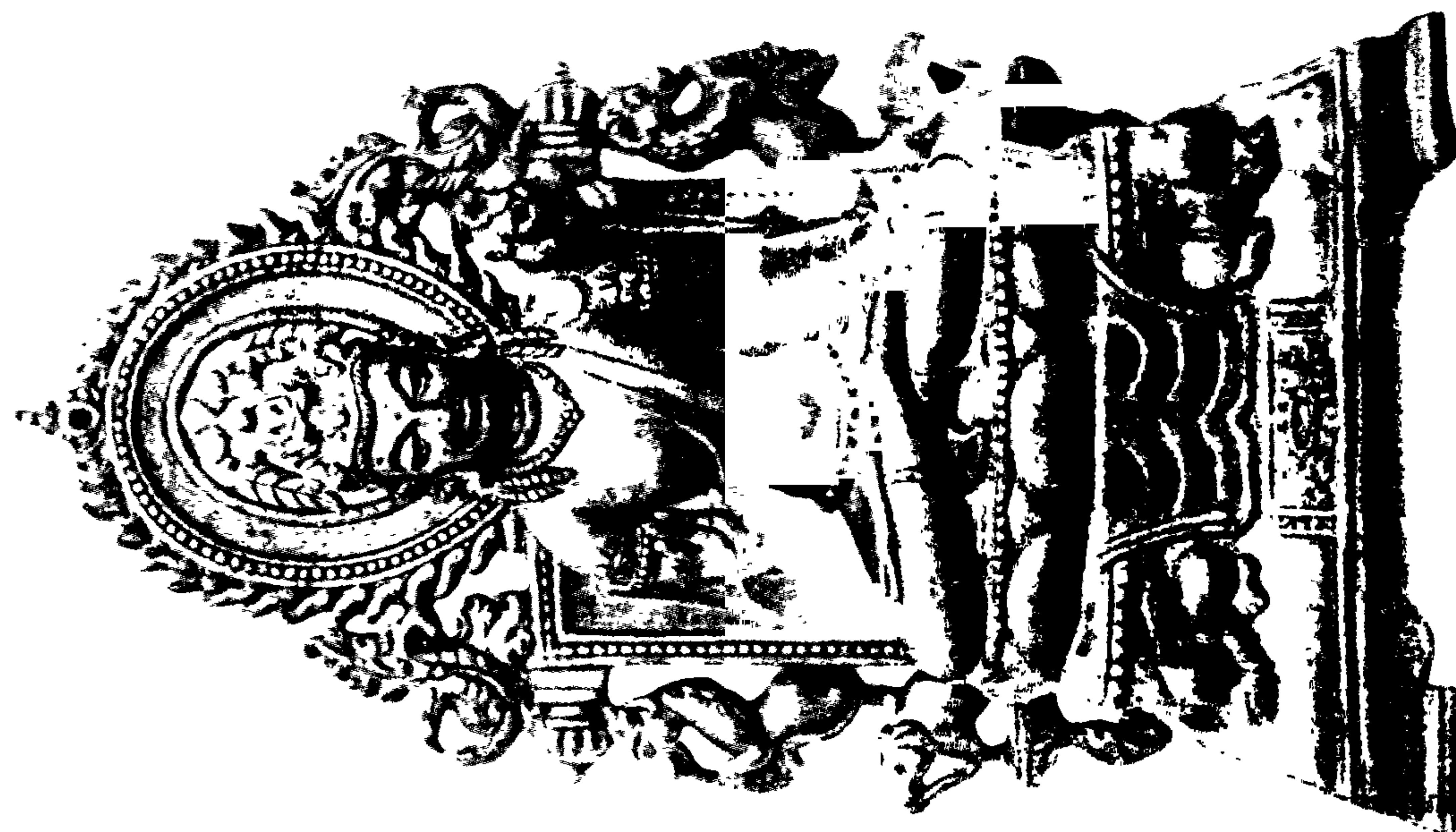


A

Bronzes from Nālandā. Height, A. 11 in., B, 1 ft. 1 in.



A



B

Bronzes from Nālandā. Height, A. 1 ft. 8 in., B, 1 ft.

with wax, which in turn, is coated with a layer of clay. After dissolving the wax away by heating, the mould is used for casting the bronze.

This summary account of ancient Indian bronzes shows that the art of casting bronzes went back to remote antiquity and was practised till recent times. These bronzes give us an idea of the beginning, development and decadence of the art through the ages.

4. CHEMICAL ANALYSIS

No chemical analysis of the Nālandā bronzes, representing as they do a very important stage in technical skill and metallurgical knowledge of ancient India, seems to have been published so far, and very little is known about their forging, casting, soldering, heat-treating, etc. It was, therefore, thought desirable to institute a systematic enquiry into these problems by undertaking a detailed examination of a few representative Nālandā bronzes. The present paper embodies the result of chemical analysis carried out by the writer and records, for the first time, some scientific data about them.

Most of the bronze specimens were covered with green patina and corrosion-products when excavated out. For the preparation of the specimens for quantitative chemical analysis the patina and corrosion-products were removed, and the sound metallic core, wherever available, was selected for analysis. The results of chemical analysis are given in the accompanying table (p. 56).

One sample, completely mineralized, gave the following composition:—

Cu, 70·69; Sn, nil; Pb, nil; Fe, 0·60; Zn, 5·40; Ni, tr.; total 76·69.

When calculated to 100 per cent, the composition becomes:—

Cu, 92·17; Sn, nil; Pb, nil; Fe, 0·78; Zn, 7·04; Ni, tr.; total 99·99 %.

The sample, therefore, represents an alloy of copper and zinc, in other words brass.

From the table it will be seen that specimens 7, 8, 10 and 17 are composed of copper containing minute amounts of tin; specimens 9, 11, 16 and 18 are brass; and the remaining specimens represent bronze. Most of them contain appreciable quantities of lead, which was evidently added to render the alloys more fluid and better-suited for casting. Specimen 11 is of brass, as it contains more than 7 per cent of zinc. Specimens 3, 4, 5, 13 and 14 are high-tin bronzes, containing 14·62 to 23·68 per cent of tin. The four copper specimens, 7, 8, 10 and 17, contain small amounts of tin, lead, zinc and iron as impurities. Most of the specimens contain minute amounts of nickel, and the others contain traces of it. It is significant that no specimen is completely free from nickel. Only three specimens, 11, 12 and 13, have been found to contain traces of arsenic, and specimen 6 contains an appreciable amount of antimony. Another significant fact revealed by these analyses is the presence, in small quantities, of zinc in most of the specimens. The presence of arsenic in traces in a few specimens only indicates that the method of smelting copper was more refined than in the Harappan times, as objects from that culture have been found to contain a much higher proportion of arsenic as an impurity.[1]

5. SOURCES OF THE MATERIAL

As the number of bronzes unearthed at Nālandā is very large, it is evident that the Nālandā craftsman must have had a copious supply of copper for casting the images.

[1]Marshall, *op. cit.*, II, p. 484.

No. and description	*Sn*	*Pb*	*Cu*	*Fe*	*Zn*	*Ni*	*As*	*Sb*	*So_3*	*Mn*	*Total*
1. Sound metallic core	9·10	5·00	79·60	5·80	...	tr.	...	...	...	0·30	99·80
2. Sound metallic core	8·99	3·12	82·19	4·16	1·81	0·11	...	...	...	...	100·38
3. Heterogenous core	16·19	2·78	76·98	0·36	...	0·05	...	...	...	...	96·36
4. Sound metallic core	23·68	...	75·54	tr.	...	tr.	...	1·8	...	...	99·22
5. Sound metallic core	14·62	2·64	81·23	0·92	0·44	tr.	...	...	...	...	99·85
6. Heterogenous and corroded core ...	7·88	...	79·71	3·21	4·82	tr.	...	1·48	...	...	97·10
7. Sound metal ...	1·19	2·22	91·62	1·39	2·61	0·18	...	...	...	...	99·21
8. Corroded metal ...	0·08	0·04	97·14	0·48	...	0·09	...	...	...	...	97·83
9. Sound metallic core	0·40	2·08	79·58	1·12	1·64	1·20	...	...	...	...	100·02
10. Sound metallic core	0·20	0·05	97·85	0·77	0·10	0·20	...	...	...	...	99·17
11. Sound metallic core	1·15	3·10	85·25	2·41	7·54	0·09	tr.	tr.	...	...	99·54
12. Corroded metallic core ...	8·90	5·17	80·20	3·86	...	0·09	tr.	tr.	...	...	98·22
13. Sound metallic core	15·60	2·55	78·75	2·30	...	0·18	tr.	tr.	...	...	99·38
14. Sound metallic core	15·09	3·06	80·84	1·30	0·05	0·08	...	...	...	...	99·98
15. Sound metallic core	8·70	5·93	82·15	2·67	0·06	0·42	...	...	0·31	...	99·93
16. Sound metallic core	0·74	3·03	78·95	1·47	15·15	0·65	...	...	...	...	99·99
17. Slightly corroded metallic core ...	1·93	...	93·07	2·07	1·91	tr.	...	...	...	...	98·98
18. Sound core ...	1·29	...	79·98	2·57	16·00	tr.	...	...	...	...	99·84

In this connexion it may be observed that in Hazaribagh District in Bihar extensive remains of ancient copper-workings have been found.[1] Here copper pyrites occurs together with a little galena and zinc blende. Since most of the Nālandā alloy-specimens from the images have been found to contain both zinc and lead, it is very likely that the Hazaribagh copper-ore was used by Nālandā artisans for smelting copper for their bronzes. The Hazaribagh copper-workings, it may be observed, are only about 200 miles away from Nālandā.

[1] J. Coggin Brown, *India's Mineral Wealth* (Oxford, 1936), p. 90.

The source of tin which was used for casting bronzes can also be traced to Hazaribagh District, where the tin-ore casseterite has been found in four localities.[1] The tin-mines of Hazaribagh are no doubt at present poor, but they may have been richer in early days and may have formed a very convenient source of the metal at Nālandā. The results of the analysis show that in nine specimens, the proportion of tin ranges between 7·88 per cent and 23·68 per cent, whereas four specimens show tin between 1 and 2 per cent, and only two contain less than 1 per cent. The presence of tin to the extent of only 1 to 2 per cent cannot be considered as an intentional addition. These six specimens of the latter group are not bronze, but three of them are really brass as they contain more than 7 per cent zinc; the remaining three of this group can be described as copper objects containing small amounts of tin, zinc and lead as impurities.

It is significant that most of these specimens are free from arsenic but nickel is invariably present, if in traces. Minute traces of impurities present in ancient objects are of special importance, as sometimes they are characteristic of the ores from which the metal was smelted and hence serve as valuable clues to the source of the original ores. In the absence of facilities for spectrographic work, this aspect of the problem could not be investigated, but the chemical analysis has shown that the Nālandā bronzes are characterized by the presence of nickel.

6. CONCLUSION

The data recorded here show that both bronze and brass were used for casting images. The close proximity of tin and copper mines of Hazaribagh was largely responsible for the growth of metal-casting at Nālandā, and high-tin bronzes were not rare. A systematic metallurgical examination of a sufficiently large number of representative bronzes, together with a spectroscopic examination, can furnish material evidence regarding the metallurgical processes employed at Nālandā, and to this extent, the analytical data based on chemical examination are incomplete. The results presented in this paper are, nevertheless, essential to a clear understanding of the composition of alloys employed and the sources of the metals used. Further examination is, however, under way and is likely to contribute materially to our knowledge of ancient metallurgy.

The author's grateful thanks are due to his colleagues in the Department for the preparation and preliminary examination of the samples and the photographs.

[1] Coggin Brown, *op. cit.*, p. 103.

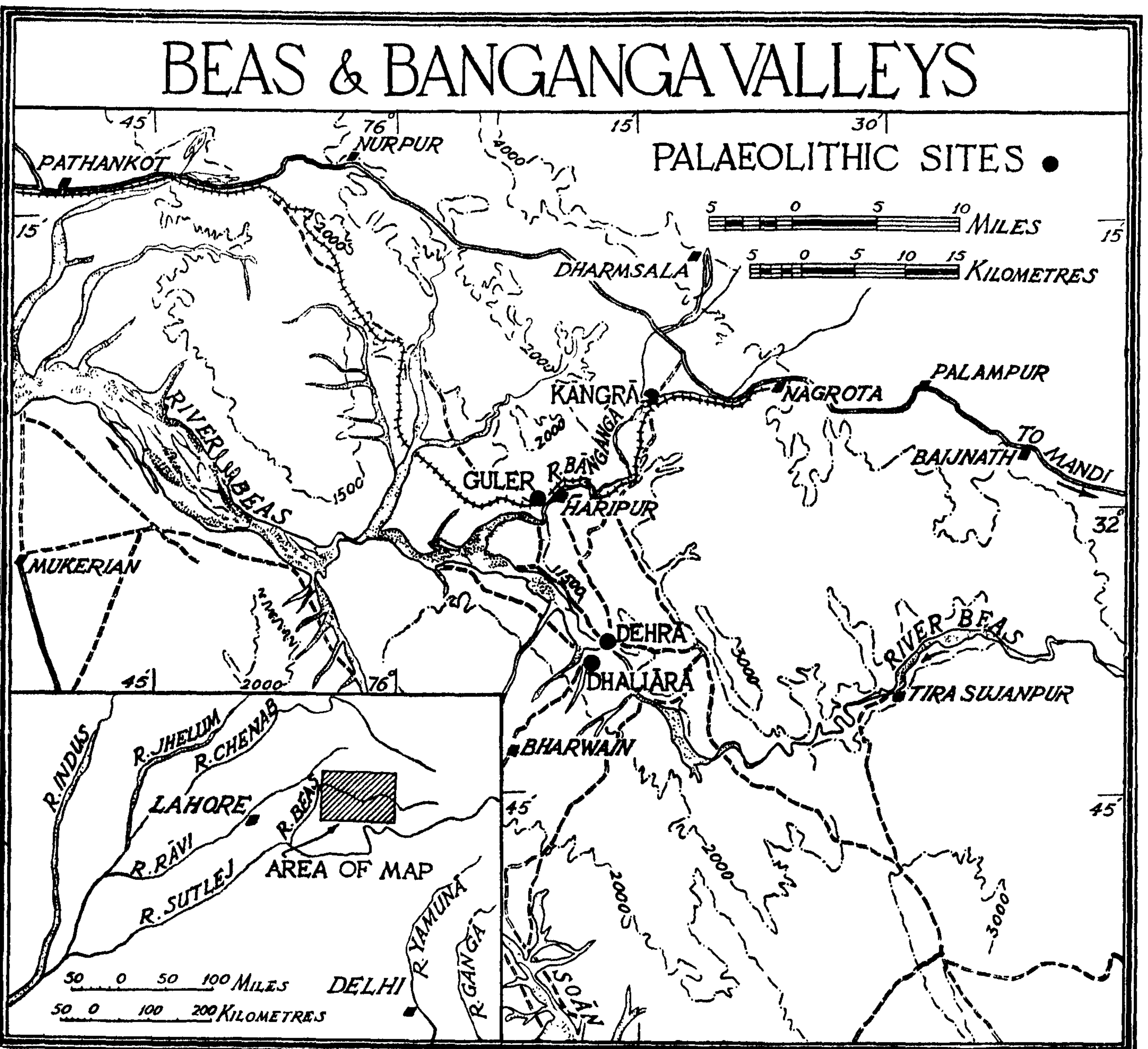

BEAS & BANGANGA VALLEYS
PALAEOLITHIC SITES
MILES
KILOMETRES
PATHANKOT
NURPUR
DHARMSALA
KANGRA
NAGROTA
PALAMPUR
BAIJNATH
TO MANDI
GULER
HARIPUR
R. BANGANGA
DEHRA
DHALIARA
BHARWAIN
TIRA SUJANPUR
RIVER BEAS
SOAN
MUKERIAN
R. INDUS
R. JHELUM
R. CHENAB
LAHORE
R. RAVI
R. SUTLEJ
R. BEAS
AREA OF MAP
DELHI
R. YAMUNA
R. GANGA

FIG. 1

PALAEOLITHS FROM THE BEAS AND BANGANGA VALLEYS, PANJAB

By B. B. Lal

CONTENTS

1. INTRODUCTORY

WITH the Partition of India in 1947, the palaeolithic sites of the Sohan and Indus valleys, discovered from time to time by D. N. Wadia, K. R. U. Todd, Helmut De Terra, T. T. Paterson[1] and others, passed on to the other side of the border, leaving no typical site of the 'Sohan' culture on this side, although certain sites containing a fair sprinkling of Sohan tools did still remain within India. One, however, felt that there was every likelihood of similar palaeolithic sites being encountered in the sub-Himalayan region of partitioned India. This expectation was fulfilled for the first time in 1951, when Olaf Prüfer hit upon certain sites bearing tools essentially of the Sohan type in the valley of the Sirsa, a tributary of the Sutlej, near Nalagarh, the headquarters of a former Princely State in Panjab. At his invitation, D. Sen of the Calcutta

[1]H. De Terra and T. T. Paterson, *Studies on the Ice Age in India and associated Human Cultures* (Washington, 1939).

University visited the place and published a short report on the tools and terrace-sequence of the area.[1] Recently Y. D. Sharma came across a few more palaeolithic sites in the Sirsa valley and also noticed the presence of the Sohan lithic industry on the banks of a homonymous river, a tributary of the Beas, near Daulatpur in Hoshiarpur District, Panjab.[2]

Tools of the Sohan type have been discovered in non-Himalayan regions as well, the more important amongst them being: the Singrauli basin in District Mirzapur, U.P.;[3] the valleys of the Gambhiri, Chambal, etc., in District Chittor, Rajasthan;[4] the Mahi valley in Gujarat;[5] and the valleys of the Sagileru and Enumaleru near Giddalur, District Kurnool, Andhra.[6] But the sites concerned cannot be classed as being of the 'Sohan' type, since they contain a much greater percentage of non-Sohan ('Madras') tools.

Returning to the problem of the typical Sohan sites, the author has the satisfaction of recording that during his explorations in the Kangra District, Panjab, in June 1955, he discovered four sites of this class, viz. Guler, Dehra, Dhaliara and Kangra (fig. 1). The first two sites yielded a large number of tools and the latter two only a few; this difference may perhaps be due to the comparative time devoted to the exploration of the sites concerned.

Consisting essentially of Siwalik formations, this region is drained off by the Beas and its tributaries, which nltimately form a part of the Indus system. Suitable pebbles, particularly of quartzite, being available in abundance in the river-beds and -terraces, the area formed a very convenient habitat for the prehistoric man.

During the course of exploration of the area, which lasted for about a week, the author was assisted by Shri U. C. Sharma, Shri Narendra Nath and Shri J. N. Shivapuri, members of North-western Circle of the Department, besides his wife, Kusum Lal. To the preparation of illustrations many hands have contributed. The photographs of the sites were taken by the author himself, but the rest of the related work was done by Shri S. K. Rishi of the North-western Circle. The photographs of the tools are mostly by Shri B. P. Asthana of the Northern Circle and a few by Shri Ranjit Gupta of the Director General's office. The drawings and maps have been prepared variously by Shri Amir Singh, Shri A. K. Ghosh, Shri Jassu Ram, Shri Ram Babu and Shri A. S. Ahluwalia, the first four of the Director General's office and the last of the Northern Circle. To all these persons and to those others who may have helped the author even indirectly, the author's thanks are due.

2. GULER

A. The site

Guler (32° 1′ N. Lat. and 76° 9′ E. Long.) is a station on the Kangra-Pathankot section of the Northern Railway, about 14 miles from Kangra (fig. 1). The village from which the station derives its name is about three-fourths of a mile south of the latter (fig. 2). Both the village and the railway-station lie on the right bank of the Banganga

[1] D. Sen, 'Nalagarh palaeolithic culture', *Man in India*, XXXV, no. 3 (July-Sept. 1955), pp. 176 ff.

[2] *Indian Archaeology 1954-55—A Review* (New Delhi, 1955), p. 58.

[3] V. D. Krishnaswami and K. V. Soundara Rajan, 'The lithic tool-industries of the Singrauli basin, District Mirzapur', *Ancient India*, no 7 (1951), pp. 40 ff.

[4] *Indian Archaeology*, *op cit.*, p. 58. Information from Shri M. N. Deshpande and Shri S. R. Rao.

[5] B. Subbarao, 'Archaeological explorations in the Mahi valley', *Jour. M. S. Univ. Baroda*, I (1952), pp. 33 ff.

[6] K. V. Soundara Rajan, 'Stone Age industries near Giddalur, District Kurnool', *Ancient India*, no. 8 (1952), pp. 64 ff.



The Banganga river and its terraces near Guler: view from top of Terrace 1 on Guler side, looking south-east; township of Haripur on the other side of the river. *See page 61*



Panoramic view of the terraces of Banganga near Guler. See page 61

To face page 61



A. *View of the Banganga with Haripur fort on the hillock on the right.* *See page 61*



B. *View showing the bed-rock (Middle Siwalik sandstone and shales) and the overlying terraces of the Banganga near Guler.* *See page 61*

river, which, originating in the Himalayas to the north-east of Dharmasala, the District headquarters, joins the Beas about four miles south-west of Guler. On the left bank of the Banganga, opposite Guler, is the town of Haripur with a small inspection-bungalow, police-station and high school. Now merged into the district of Kangra, Haripur-Guler was once a Princely State, and a fort, perched on a high rock (pl. XVIII A), bears testimony to its ancient glory.

B. River-terraces

A survey of the landscape around Guler[1] brought to light five terraces of the Banganga river, which, beginning from the highest, are named here as T1, T2, etc. (figs. 2 and 3; pls. XVI and XVII). The underlying bed-rock consists of pepper-coloured sandstone interbedded with red shales, which are typical of the Nagri zone of the Middle Siwaliks. Considerably tilted, the beds are laid bare at several places by subsequent erosion (pl. XVIII B).

After walking about 3 furlongs to the north from the Guler railway-station, along the railway-track, one sees to the left a wide gully eroded by a *nullah* which falls into the Banganga. Leaving the track and climbing up and up along the *nullah* to the west one finally emerges on a fairly flat stretch of land measuring about 3×2 furlongs (partly washed away).[2] This is the highest level ground around Guler, with an approximate height of 565 ft. from the river-level, and has been called Terrace 1. In the north-western sector of this terrace are located a few huts which go by the name of Pirwala Basa. The area on the south is called Trimedi,[3] and near the southernmost end of the terrace is the bench-mark of the Survey of India, recording a height of 1964 ft. above mean sea-level. On pl. XVII can be seen the southern sector of this terrace, distinguished by a solitary banyan-tree.

Lithologically, Terrace 1 consists of large-sized boulders, intermixed with medium- to small-sized, sub-angular pebbles and earth (pl. XIX A). Up to 3 ft. in length, the boulders bear prominent 'chatter'-marks (pl. XIX B). The soil is red and sandy. Palaeolithic implements were collected mostly from the surface, near about localities marked A and B on fig. 2.

Terrace 2 is represented by a large flat land, on which is situated the village of Ghatutar (fig. 2; pls. XVI and XVII).[4] It can be approached conveniently from the Guler railway-station, which, in fact, is situated right at the foot of this Terrace. Its approximate height from the river-level is 375 ft., i.e. 190 ft. less than that of Terrace 1.

In section, the Terrace consists of a thick deposit of silt, under which lie boulders intermixed with pebbles. Having been washed down from Terrace 1 and redeposited in Terrace 2, the boulders in the latter are worn out and are smaller.

Palaeoliths were collected from the exposures alongside a small *nullah* running north-south near locality marked D (fig. 2, where, however, the *nullah* has not been shown), as well as from the slope of the Terrace near locality C (pl. XX). Locality E was the one where the tools were first encountered, and since the terrace-sequence had not been worked out at that stage, some tools from lower levels, which more correctly would belong to Terrace 3, also got mixed up. But, as soon as the terrace-sequence became

---

[1] Owing to lack of time the terraces on the Haripur side could not be studied in detail. It was, however, observed that both Haripur and Guler (railway-station) were located on the same terrace (T3).

[2] Near the source of the *nullah* the climb is rather steep.

[3] The place may also be approached *via* Ghatutar village on Terrace 2.

[4] Houses belonging to the Ghatutar village also continue down the slope, but it is the ones on the higher level that are situated on Terrace 2.

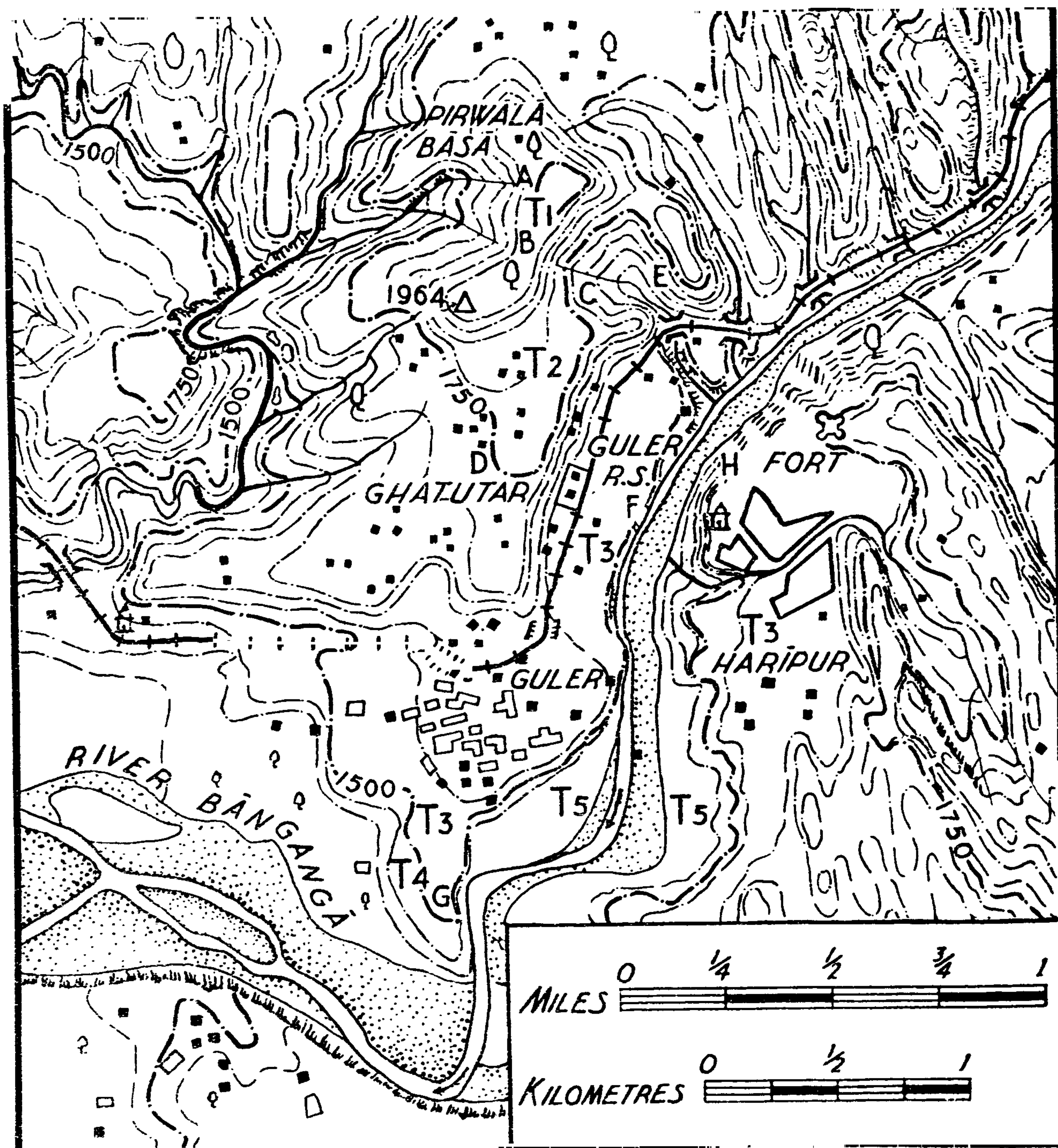

BANGANGA TERRACES NEAR GULER
PIRWALA BASA
A
T1
B
1964
C
E
T2
1750
1500
D
GULER R.S.
GHATUTAR
F
T3
H FORT
T3
HARIPUR
GULER
RIVER BANGANGA
1500
T3
T5
T5
T4
G
1750
MILES
0
1/4
1/2
3/4
1
KILOMETRES
0
1/2
1

FIG. 2

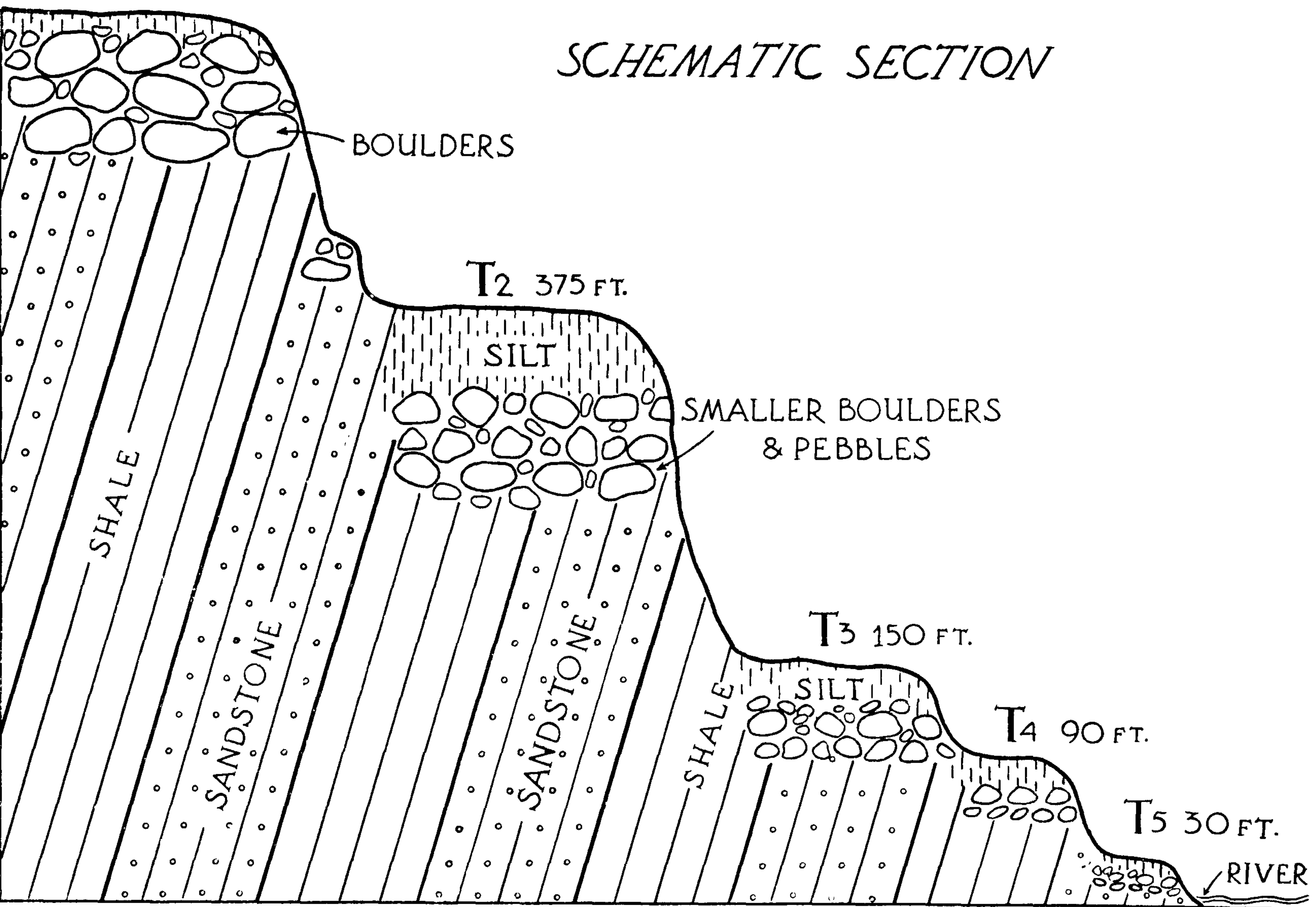

BANGANGA TERRACES NEAR GULER
SCHEMATIC SECTION
T1 565 FT.
BOULDERS
T2 375 FT.
SILT
SMALLER BOULDERS & PEBBLES
T3 150 FT.
SILT
T4 90 FT.
T5 30 FT.
RIVER
SHALE
SANDSTONE
SANDSTONE
SHALE

FIG. 3

clear, all the tools from locality E, except those the exact height of whose findspots above the river-level had been definitely recorded, were separated: they have been treated accordingly in this report.

On the Haripur side of the river, near the police-station, is a high isolated block of land overgrown with a *pīpal*-tree (pl. XVII, left middle distance). A comparison of the terraces on the Haripur side with those on the Guler side showed that this area was much higher than Terrace 3 (described below) but lower than Terrace 2. In all likelihood, therefore, this block of land is a surviving portion of Terrace 2, the other portions having been since eroded. Thus, the tools collected from here (locality marked H on fig. 2) have also been assigned to Terrace 2.

Terrace 3 is the vast open land in front of the Guler railway-station, covering more than a mile from north to south and nearly a quarter of a mile across. The Guler village itself is situated on the talus washed down from Terrace 2, but the open area south of the village is again a part of Terrace 3. On the Haripur side of the river, its counterpart is represented by the open land in front of the inspection-bungalow and the school.

With a height of about 150 ft. from the river-level (i.e. having a drop of about 225 ft. from the preceding Terrace), Terrace 3 is composed of medium-sized boulders (1 to 1½ ft. in diameter), closely packed with pebbles and superimposed by a comparatively thin layer of silt. At one place the thickness of the boulder-*cum*-gravel deposit was noted to be about 13 ft. and that of the overlying silt about 2 ft., while at another place, near locality G, the former deposit was observed to be nearly 25 ft. thick and the latter about 3 to 4 ft. At a few other places, however, the bed-rock was visible only a few feet below surface.

From Terrace 3, palaeoliths were collected at localities F and G (fig. 2). The former was a rain-gully cut through the Terrace, while the latter was an open stretch of land where the tools lay exposed on the surface itself.

The area to the south and west of locality G is about 60 ft. lower than Terrace 3, and it gave the impression of being a terrace, T4. However, the author was not quite sure of it, as the stretch of land was too limited and no other remnants of the Terrace were observed in the neighbourhood. In fact, a more thorough exploration of the area is called for before the identity of this Terrace can be established.

No tools were obtained from Terrace 4. A few that were collected south of locality G, at a level lower than that of Terrace 3, lay in fact in the talus from that Terrace and should be ascribed to it.

Terrace 5, the youngest of the terraces, was observed to be about 30 ft. higher than the level of the river. Raja-ka-Bagh, a little to the south-east of the Guler village, is situated on this Terrace. The land on the left bank of the river opposite Raja-ka-Bagh is also assignable to it. Owing to its low height, it is liable to be inundated in exceptionally high floods.

From bottom upwards, Terrace 5 consists of coarse gravel which gradually becomes finer, and the whole is overlain by a 4 to 5 ft. thick deposit of silt.

No tools of any kind were recovered from Terrace 5.

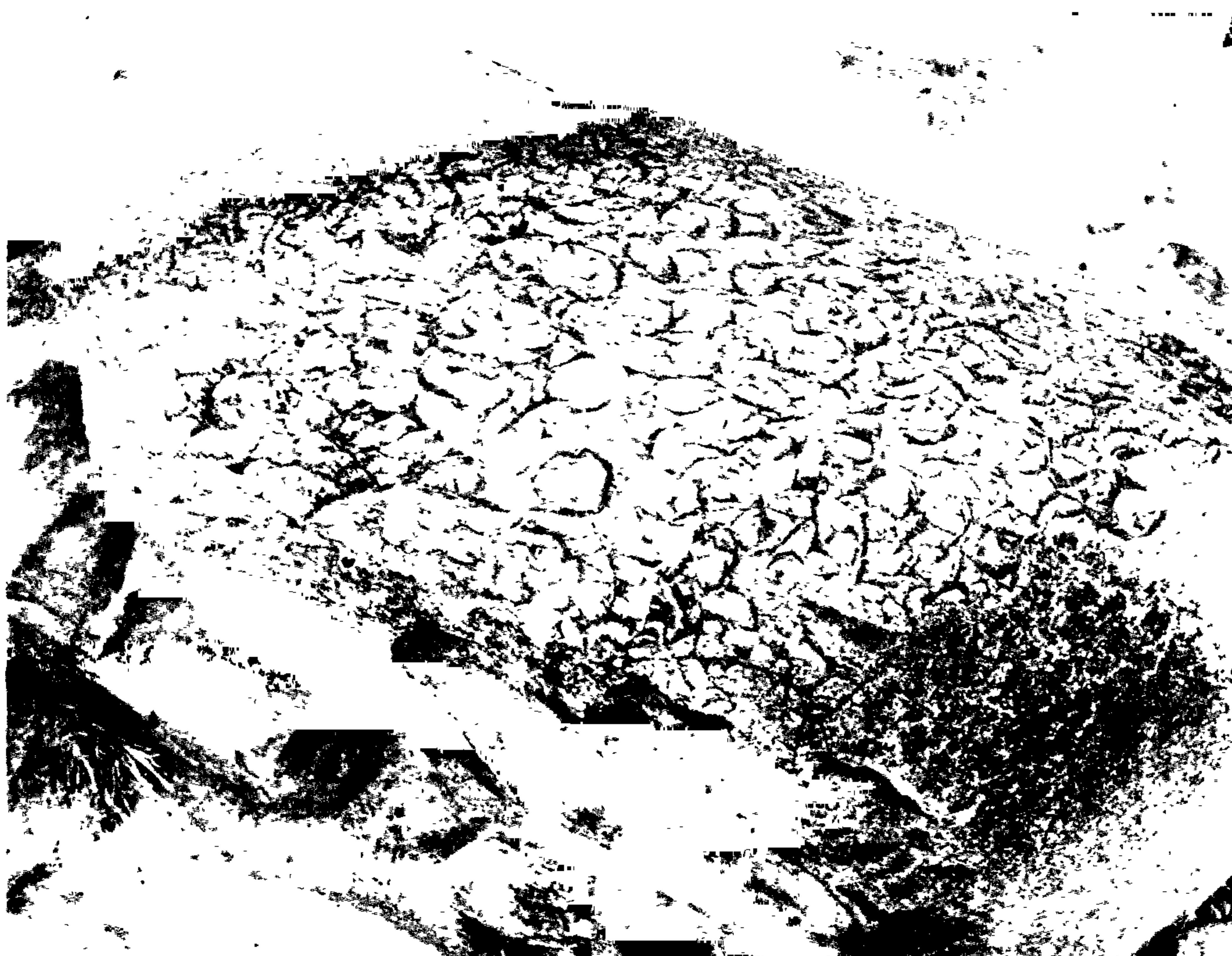
C. The tools

(i) *Typological classification*

Since there is no evidence to determine the exact use to which the various kinds of tools were put by the palaeolithic man, a classification of these tools on the basis of their



A. *A section of Terrace 1 near Guler, showing large-sized boulders intermixed with smaller pebbles and earth.* *See page 61*



B. *Close view of a boulder with 'chatter'-marks in Terrace 1 near Guler.* *See page 61*

To face plate XXI



View showing eroded parts of Terrace 2 near localities C and E, from top of Terrace 1 near Guler. *See page 61*



Terraces of the Beas and its tributary nullah near Dehra. *See page 71*

To face page 65



A. *View of the implementiferous gravel near Dehra.* *See page 71*



B. *View of the Beas near Dehra.* *See page 71*

supposed use is likely to be erroneous. To take, for instance, the well-known type, handaxe: it is difficult to be sure that this kind of tool was used only with the hand (and not by hafting), and it is still more difficult to be sure that it was used as an axe, for its narrowed end suggests that it may have been used more probably for digging out roots etc. than for cutting—a function implied by the use of the term 'axe'. In fact, the 'cleaver' is more akin to the conception of the axe than the handaxe itself. Likewise, such terms as 'chopper', 'chopping-tool', etc., are also open to similar objections, as one cannot be too sure of the functions of these tools. The 'chopper', as Movius himself has stated, may have been used as a 'scraper' as well.[1] Again, the term 'pebble tool' is meant to be applied only to a particular kind of tool, but it has been sometimes used, in its literal sense, for any tool made on pebble.

It would thus be clear that the terminology that we have been using for palaeolithic implements is not based on any definite principle. A term once coined is continued without scrutiny. It is, however, time that scholars working on the subject discussed and decided the issue, so that a uniform nomenclature could be used in future.

For the present, the author has to remain content with the use of the letters of the alphabet for the different types of tools. However, since such a course is rather unconventional, the terms in vogue have also been used alongside.

All the tools collected from Guler are made on pebbles or on flakes struck therefrom. Mainly of fine- to medium-grained quartzite, the pebbles have a variety of shapes—sub-angular, oval, spheroid, etc. In the case of the first two shapes, the pebbles are generally flat-based,[2] which factor seems to have played an important part in guiding the type of flaking as will be clear from the following. In the case of a spheroid pebble it is essential to take out flakes from both the upper and lower surfaces in order to obtain a sharp cutting-edge. In the case of a flat-based pebble, however, a sharp edge can be obtained by taking flakes merely out of the upper surface. Since at Guler mostly flat-based pebbles were used for the preparation of tools, the prehistoric man obviously found that unifacial flaking was sufficient to obtain a sharp edge. This would perhaps explain to a large extent the predominance of unifacial 'choppers' and the comparative dearth of bifacial 'chopping-tools' at Guler and other allied sites in the Beas and Banganga valleys.

The following typological classification of the tools is proposed.

A: UNIFACIAL 'CHOPPER'.—Under this group are classed tools made mostly on sub-angular or oval pebbles with a flat ventral surface. As a result of the latter feature, the working-edge was obtained by flaking merely a part of the dorsal surface. The group may be divided as follows according to the shape and extent of the working-edge.

Type A i has a working-edge which is straight or nearly so (figs. 4 and 5, *4*; pls. XXXIII and XXIV). The butt-end is usually sub-angular and the working-edge is mostly at right angles to the axis from the butt-end to the edge. The flaking is at a high angle, sometimes up to 80°, to the undersurface. Since the edge is not sharp, as compared with that in types A ii and A iii below, it is likely that this type of tools may have been used more suitably for scraping than for cutting.

Type A ii is characterized by a crescentic working-edge, which generally does not extend beyond half the periphery of the pebble (figs. 5, *5* and *6* and 6, *7*; pls. XXV and

[1] H. L. Movius (Jr.), 'Early Man and Pleistocene stratigraphy in southern and eastern Asia', *Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University*, XIX, no. 3 (Cambridge, Mass., 1944), p. 41.

[2] Naturally and not through any kind of splitting.

XXVI A). The butt-end is sub-angular and is always opposite the working-edge. The flaked surface in this case makes a lower angle, sometimes about 45°, with the ventral side than it does in type A i, with the result that a sharper edge is produced. The reverse view of the tool sometimes displays a fine scalloped outline of the edge (fig. 5, *5*; pl. XXV A).

Type A iii has a 'fan-shaped' working-edge, which extends even beyond half the periphery of the pebble (figs. 6, *8* and *9* and 7; pls. XXVI B-XXVIII). Another important distinction between types A i and A ii on the one hand and A iii on the other is that, while in the former the butt-end is invariably sub-angular, in the latter one usually holds the tools along a side which may be either curved (in the case of oval pebbles) or roughly straight (in the case of sub-angular pebbles). The angle which the flaked surface makes with the undersurface is usually low, so that a sharp edge is produced. As in the case of type A ii, here also the reverse view of the tool sometimes shows a nice scalloped outline of the edge (fig. 6, *9*; pl. XXVII, *9*).

Type A iv stands in marked contrast to the above three types; here the pebble used is an elongated quadrangle, and the working-edge is formed by taking out flakes from the two longer and one of the shorter sides, while the other shorter side, remaining unflaked, functions as the butt (fig. 8, *13*; pl. XXIX A). The result is that more prominence is gained by the lateral working-edges than by the frontal one. Since only one tool of this type was obtained, one cannot be too sure if it really represents a type: maybe it is just a freak. However, if on further exploration more specimens of this kind are encountered, it would appear that it was both a side- and a front-tool (or perhaps only a side-tool) in contrast to the previously-noted types, which have the working-edge essentially opposite the butt.

B: BIFACIAL 'CHOPPING-TOOL'.—As stated above (p. 65), at Guler and the other sites dealt with in this paper, bifacial flaking was observed mainly in the case of spheroid pebbles. This was a necessity in such pebbles, as otherwise a sharp edge could not be obtained. The flaking is quite often alternate, which results in a wavy working-edge. On the basis of the extent of the working-edge, the group may be subdivided. Thus, *type B i* would have the working-edge limited to a part of the periphery, while in *type B ii* the edge may extend all around (fig. 8, *14*; pl. XXIX B).

C: 'PEBBLE HANDAXE'.—This group of tools is usually made on a roughly oval pebble with a flat ventral surface. Flakes are taken out of the dorsal surface from two opposite sides in such a way that a pointed end is produced, which is the distinguishing feature of the type (figs. 8, *15* and 9, *16*; pl. XXX). The medial ridge, emerging from the point, runs upwards roughly along the axis of the tool. In the collected specimens the flaking is found confined to a part of the periphery, the remaining part, with its original pebble surface, serving as the butt. As, amongst the pebble tools, this type has a rough resemblance to the handaxe, it has been provisionally called 'pebble handaxe'.

D: HANDAXE.—Under this group come the usual bifacial handaxes, with their surfaces, both lower and upper, flaked and finished. Their subdivisions are already well-known, and one need not go into details: it would suffice to say that the Abbevillian and Acheulian types have been respectively called in this paper types D i and D ii. Further subdivisions, following the early, middle and late types of the Abbevillian and Acheulian handaxes, have not been considered necessary in the present context, since, in all, two specimens, one each of types D i and D ii, were found (fig. 9, *17* and *18*; pl. XXXI). Even these specimens are not absolutely definite, as they are rolled and bear thermal fractures.

E: CORES.—The cores from Guler are generally discoidal in shape (*type E i*) (fig. 10; pls. XXXII and XXXIII A), although elongated or other sub-angular forms (*type E ii*) also occur. They are worked bifacially, the flaking usually running along the entire periphery. However, in many cases only one side is fully flaked, while the other retains a good part

of the cortex. The flaking is quite often alternate with the result that a wavy edge is produced. Since a few specimens have edges with marks of utilization, it is likely that they were used as tools. This, however, cannot be affirmed unless more examples of the kind are obtained.

F: FLAKES.—The flakes (figs. 11 and 12; pls. XXXIII B-XXXVI A) are divisible into four types. Under *type F i* are placed Clactonian flakes without any retouch. The angle between the platform, which is usually the pebble cortex itself, and the flake-surface is always high, say about 120°. *Type F ii* includes Clactonian flakes with the edge partly retouched and showing marks of utilization. *Types F iii* and *F iv* comprise proto-Levalloisean flakes. Of them, type F iii is roughly oval in outline and has edges retouched, sometimes considerably, showing that at least some of the specimens were used as tools; *type F iv* is elongated and roughly quadrangular in outline and has definite marks of secondary retouch on the edges which are sharp enough to indicate use.

(ii) *Terraces and the tool-sequence*

During the short exploration fiftytwo palaeolithic artefacts were collected, six from Terrace 1, eighteen from Terrace 2 and ten from Terrace 3. The remaining eighteen were collected at a time when the terrace-sequence had not been studied and thus they got mixed up. However, their provenance (neighbourhood of locality E) indicates that very likely they include specimens from Terraces 2 and 3. Chances are that a majority of them belonged to Terrace 2, but in view of the mixing up nothing can be said with certainty.

The material from Terrace 1 included: three unifacial 'choppers', one each of types A i, A ii, and A iii; one bifacial 'chopping tool' of type B ii; and two Clactonian flakes, one without and other with the retouching of the edge (types F i and F ii respectively). A general comparison of these tools with those from Terraces 2 and 3 shows that they are more crude and patinated. The fine scalloped outline of the cutting-edge found in the choppers from Terrace 2 is remarkably absent in the specimens from Terrace 1. One of the flakes is singularly large—about 9 in. across, with a prominent bulb and high angle (fig. 11, *22*; pl. XXXIII B), the like of which has not been obtained from any of the subsequent terraces. This shows that the development of the tools was towards finer and somewhat smaller ones with the passage of time.

From the typological point of view, one notes the absence of the handaxe in Terrace 1: in fact, not even a 'pebble handaxe' occurs. Similarly, the proto-Levalloisean flake is absent.

Terrace 2 yielded: six 'choppers', two each of types A i, A ii and A iii; one 'chopping-tool' of type B i; one 'pebble handaxe' of type C; one core of type E ii; six Clactonian flakes, four without and two with retouch, respectively of types F i and F ii; and three proto-Levalloisean flakes, of which two belong to type F iii and one to type F iv.

Some of these specimens show signs of patination, and one of them is even rolled. The remaining ones are, however, comparatively fresh. This difference may perhaps be explained by an assumption that, while most of the tools are contemporary with the formation of the Terrace itself, some of them may have originally belonged to the earlier Terrace, from where they were washed down and redeposited.

Technologically, the tools from Terrace 2 are finer and better manufctured than those from Terrace 1. The edges of the 'choppers' are sharp and well-defined and show marks of secondary retouch. Typologically, one notes the presence of the 'pebble handaxe', as well as of proto-Levalloisean flakes, in addition to the types occurring in the preceding Terrace.

Of the eighteen specimens which may have belonged partly to Terrace 2 and partly to Terrace 3, the classification is as follows: eight unifacial 'choppers', of which one each belongs to types A i, A ii and A iv and five to type A iii; one bifacial 'chopping-tool' of type B i; one 'pebble handaxe' of type C; two handaxes, one each of types D i and D ii; three discoidal cores of type E i; two Clactonian flakes, one each without and with retouch (types F i and F ii respectively); and one proto-Levalloisean flake of type F iv.

But for a few specimens which show signs of patination, the tools under this group are mostly fresh. From the typological point of view, many an item deserves special attention. Amongst the 'choppers', the 'fan-shaped' type, A iii, predominates, while a new type, A iv, with lateral working-edges, comes into being. Discoidal cores, some of them with fine alternate flaking and even the retouching of the edge, are met with for the first time. A neat specimen of the 'pebble handaxe' is encountered. However, the most important point is the presence of two handaxes, one each of the Abbevillian and Acheulian type (see, however, p. 66). An outstanding type of the 'Madras' industry, the handaxe is uncommon for the Guler region.

The artefacts from Terrace 3 include: seven unifacial 'choppers', two each of types A ii and A iii and three of type A i; one core of type E ii; and two Clactonian flakes, one each without and with retouch (types F i and F ii respectively). Amongst these specimens two are patinated, of which one is rolled indicating that it originally belonged one of the preceding terraces and was subsequently washed down and redeposited in Terrace 3. Typologically, there is nothing remarkable about the material. It has, however, to be

DISTRIBUTION OF TOOL-TYPES AT GULER

Type / *Terrace*	Unifacial 'chopper' with straight working-edge *A i*	Unifacial 'chopper' with crescentic working-edge *A ii*	Unifacial 'chopper' with 'fan-shaped' working-edge *A iii*	Unifacial 'chopper' with lateral working-edge *A iv*	Bifacial 'chopping-tool' with part of periphery worked *B i*	Bifacial 'chopping-tool' with entire periphery worked *B ii*	'Pebble handaxe' *C*	Abbevillian handaxe(?) *D i*	Acheulian handaxe(?) *D ii*	Discoidal core *E i*	Non-discoidal core *E ii*	Clactonian flake without retouch *F i*	Clactonian flake with retouch *F ii*	Proto-Levalloisean flake, oval *F iii*	Proto-Levalloisean flake, longish *F iv*	Total
Terrace 3 ...	3	2	2	...	...	...	...	...	...	...	1	1	1	...	...	10
Terraces 3 and 2 (mixed)	1	1	5	1	1	...	1	1	1	3	...	1	1	...	1	18
Terrace 2 ...	2	2	2	...	1	...	1	...	...	...	1	4	2	2	1	18
Terrace 1 ...	1	1	1	...	...	1	...	...	...	...	...	1	1	...	...	6
Total	7	6	10	1	2	1	2	1	1	3	2	7	5	2	2	52

remembered that some of the tools in the mixed collection dealt with in the preceding paragraphs may have also belonged to Terrace 3.

The table (p. 68) gives an idea at a glance of the tools with reference to the terrace-sequence.

(iii) *Description of illustrated specimens* (figs. 4-11; pls. XXIII-XXXVI A)[1]

Out of the fiftytwo specimens collected from Guler, twentyseven are illustrated here. They are arranged typewise and, within each type, according to the terrace-sequence.

1. Unifacial 'chopper' with a roughly straight cutting-edge and an angular butt: type A i. Both the ventral and dorsal surfaces are nearly flat. The scar on the ventral surface is a later one. Patinated. From locality B; Terrace 1.

2. Unifacial 'chopper' with a roughly straight cutting-edge and an angular butt: type A i. Both the ventral and dorsal surfaces of the pebble are nearly flat. The angle which the flaked surface makes with the ventral is fairly high, about 75°. From locality C; Terrace 2.

3. Unifacial 'chopper' with an oblique cutting-edge and an angular butt; type A i. The dorsal surface of the pebble is a little more flat than the ventral. From locality D; Terrace 2.

4. Unifacial 'chopper' with a roughly straight cutting-edge and a sub-angular butt: type A i. Both the ventral and dorsal surfaces of the pebble are flat. The angle between the flaked and ventral surfaces is fairly high, about 80°. From a gully near locality E; Terrace 2 or 3.

5. Unifacial 'chopper' with a crescentic cutting-edge and a sub-angular butt: type A ii. Both the ventral and dorsal sides are fairly flat. Particular attention may be drawn to the scalloped outline of the edge. From locality E; Terrace 2.

6. Unifacial 'chopper' with a crescentic cutting-edge and an angular butt: type A ii. The pebble is flat with an irregular outline. The edge has definite marks of secondary retouch. From locality G; Terrace 3.

7. Unifacial 'chopper' with a crescentic cutting-edge which covers nearly half the outline of the pebble and an angular butt: type A ii. The ventral side is convex and the dorsal comparatively flat. From locality G; Terrace 3.

8. Unifacial 'chopper' with a 'fan-shaped' cutting-edge which covers more than half the periphery of the pebble: type A iii. The tool is held not at a sub-angular end as the foregoing specimens but along a side which is slightly curved. The ventral surface is flat, while the dorsal slopes down towards the edge. Patinated. From locality A; Terrace 1.

9. Unifacial 'chopper' with a 'fan-shaped' cutting-edge and a curved side functioning as butt: type A iii. One may note the neat, scalloped outline of the edge. From locality E; Terrace 2.

10. Unifacial 'chopper' with a curved side functioning as butt. Though the cutting-edge is not 'fan-shaped', as in the foregoing ones, yet it has a rough approach towards that shape, particularly in contrast to type A i and A ii: hence the tool has been placed under type A iii. The angle which the flaked surface makes with the ventral is low, near about 50°. Patinated. From locality E; Terrace 2.

[1] The illustrations show respectively the dorsal, side and ventral views of the tools.

[2] As compared with the crescentic or 'fan-shaped' cutting-edges of types A ii and A iii respectively.

11. Unifacial 'chopper' with a 'fan-shaped' cutting-edge and a side functioning as butt: type A iii. Both the ventral and dorsal surfaces are flat and the angle between the flaked and ventral surfaces is low, about 50°. From a gully near locality E; Terrace 2 or 3.

12. Unifacial 'chopper' with a 'fan-shaped' cutting-edge: type A iii. Though the pebble is sub-angular, it is a side and not the sub-angular end that functions as butt. The ventral surface is flat, but the dorsal surface is uneven with a pronounced hump near the centre. Consequently the flaking is very steep, the angle between the flaked and ventral surfaces being about 75°. From a gully near locality E; Terrace 2 or 3.

13. Unifacial 'chopper' with lateral cutting-edges: type A iv. Since this is the only specimen of its kind, one cannot say if it represents a regular type or is just a freak. From a gully near locality E; Terrace 2 or 3.

14. Bifacial 'chopping-tool' made on a roughly spheroid pebble: type B ii. The flaking runs practically along the entire periphery. Patinated. From locality B; Terrace 1.

15. 'Pebble handaxe': type C. The specimen is a rolled one, but the features, particularly the pointed end and the flaking directed from two sides, are clearly discernible. From locality E; Terrace 2.

16. 'Pebble handaxe': type C. This is a well-preserved specimen. The ventral surface is flat, while the dorsal one shows a little hump towards the centre. Out of the latter surface, flakes have been removed from two opposite sides in such a way as to produce a pointed working-end, which bears clear marks of secondary retouch. A prominent medial ridge runs from the pointed end to the central hump. From a gully near locality E; Terrace 2 or 3.

17. Handaxe[1]: type D i. With its crude flaking and rough finish, it is assignable to the Abbevillian stage. While the edge shown in illustration 'b' is jagged due to alternate flaking, the one in 'd' seems to be merely the result of a thermal fracture. The surface shown in 'c' is considerably pitted, and one is at a loss to visualize the original outline and finish of the tool. From a gully near locality E; Terrace 2 or 3.

18. Handaxe[1]: type D ii. One of its sides (illustration 'a') has a smooth surface. The outline is more shapely than in the preceding specimen. Thus, the tool may be placed under the Acheulian category. However, the edge and side, illustrated in 'b' and 'c' respectively, show more of thermal than real flake-scars. Since the tool is partly rolled and worn out, it is difficult, as in no. 17, to reconstruct the original surface, particularly of the side shown in 'c'. From a gully near locality E; Terrace 2 or 3.

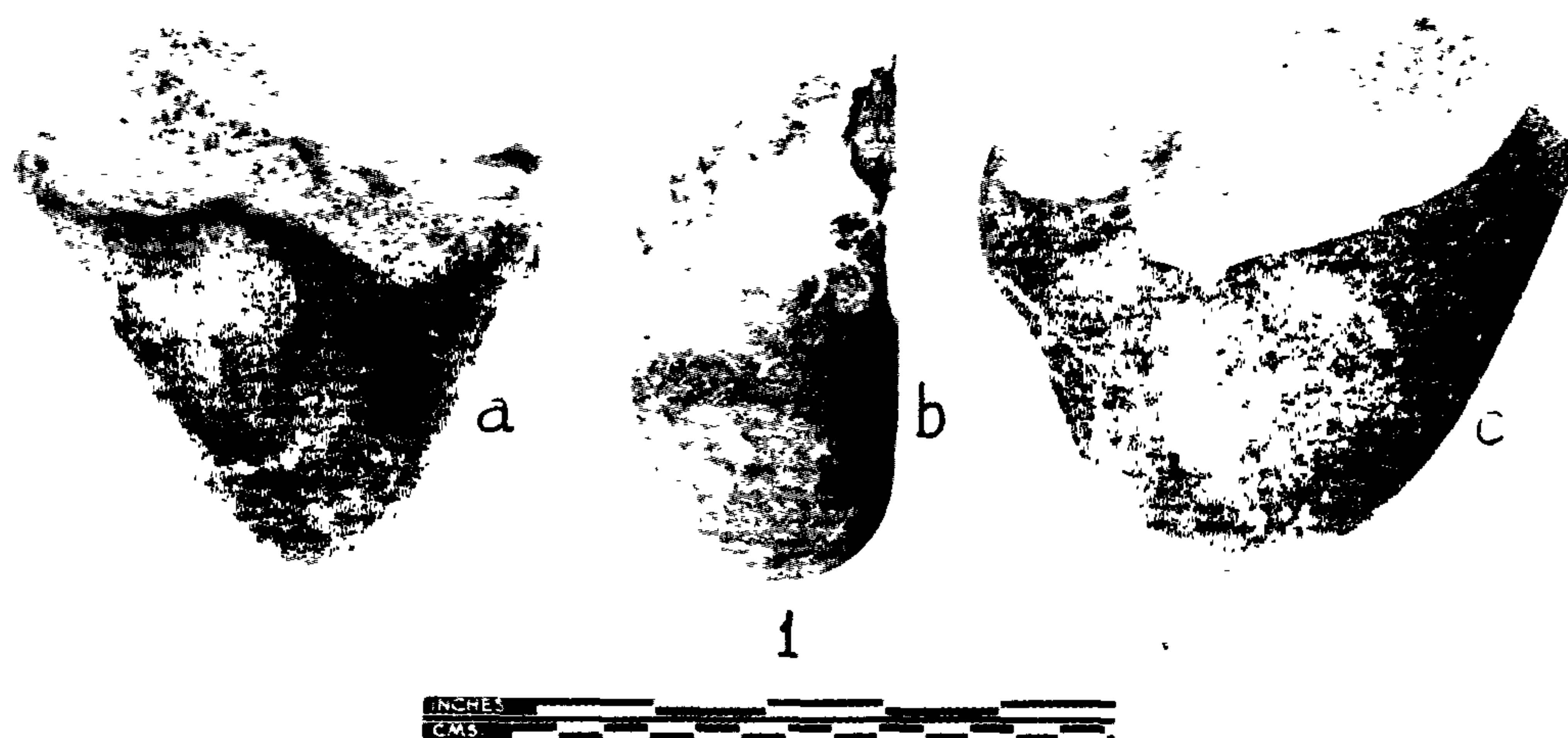
19. Discoidal core: type E i. Flakes have been removed from one side fully and from the other side (shown in illustration 'a') only partially, leaving a good part of the cortex. The flake-scars are bold and deep. As a result of alternate flaking, a sinuous edge has been produced, which also shows some batter-marks indicating that the specimen may perhaps have been used as a tool. From a gully near locality E; Terrace 2 or 3.

20. Discoidal core: type E i. This specimen also is fully flaked on one side but only partly on the other, the cortex bearing prominent 'chatter'-marks. The flake-scars are large and deep. From a gully near locality E; Terrace 2 or 3.

21. Discoidal core: type E i. This is a specimen smaller than the preceding ones. The flake-scars are, however, deep and prominent. The side shown in 'c' retains the original cortex except for a single flake-scar. From a gully near locality E; Terrace 2 or 3.

22. Clactonian flake: type F i. Struck from a boulder rather than from a pebble, the flake is large-sized, nearly 9 in. across. The bulb of percussion is very prominent as

[1] See, however, p. 66.

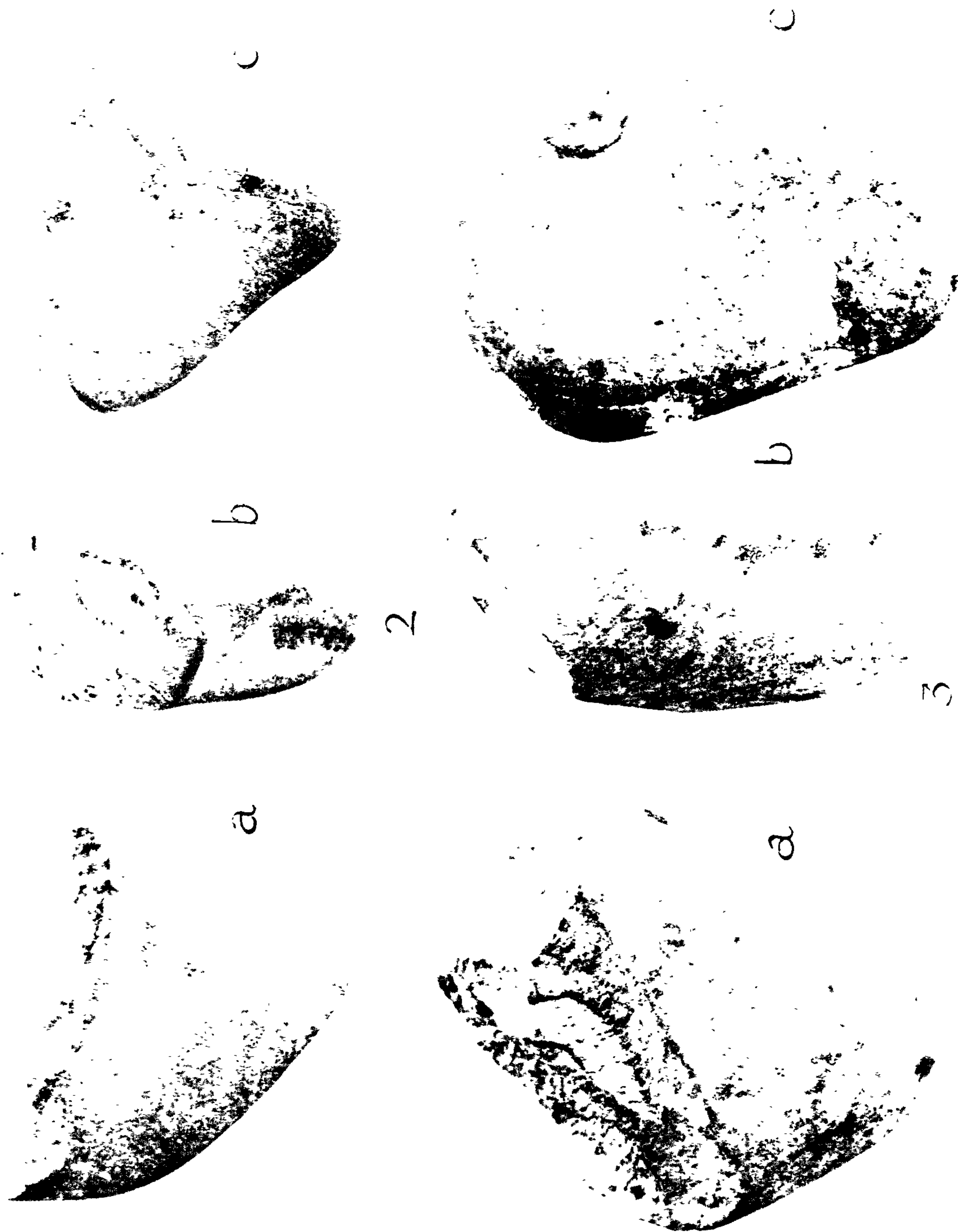


A. *Guler: unifacial 'chopper', type A i, from Terrace 1. See page 69*



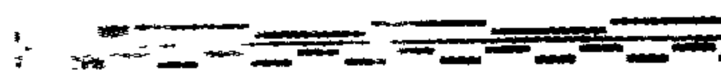
B. *Guler: unifacial 'chopper', type A i, from Terrace 2 or 3. See page 69*

To face plate XXV

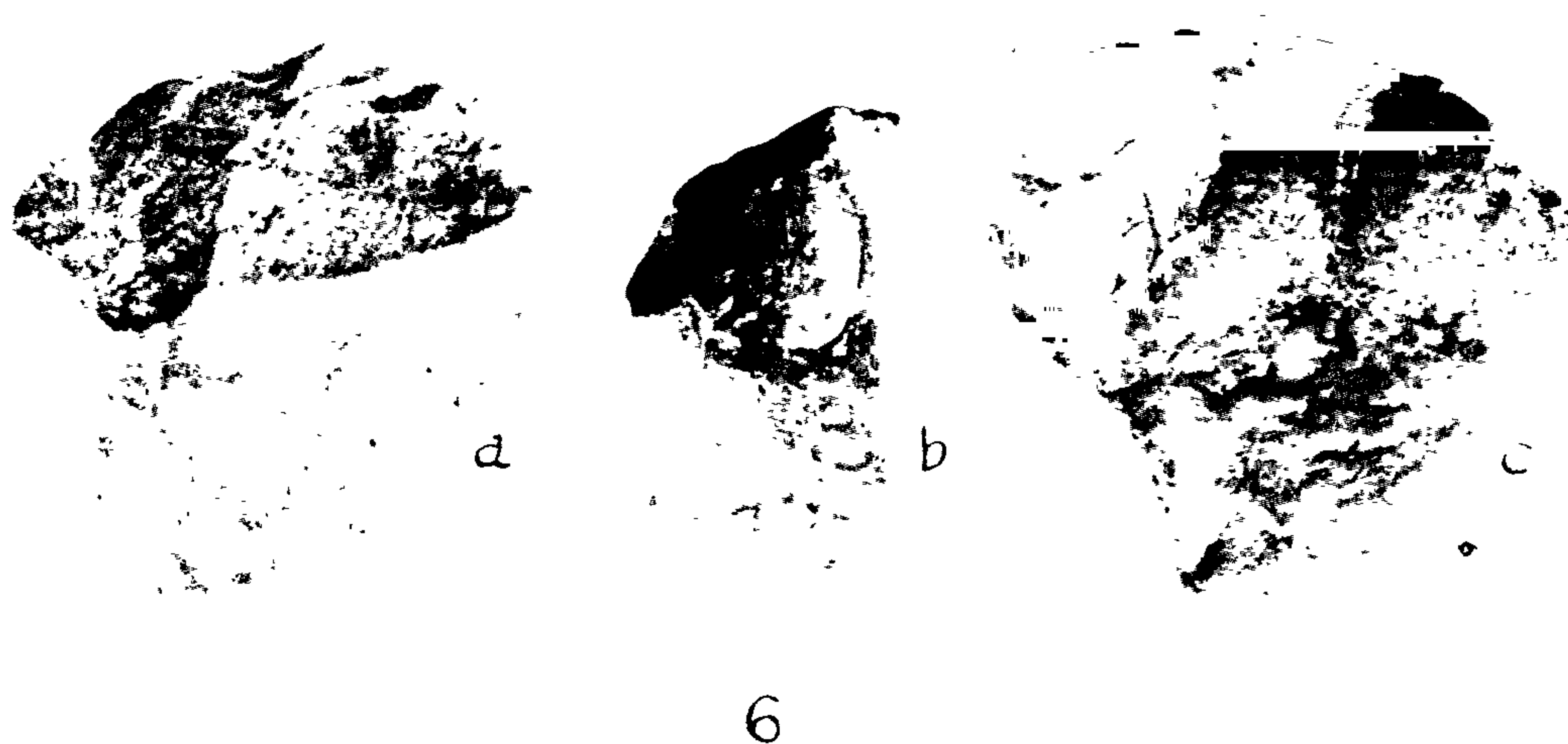


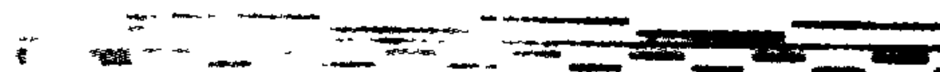
Guler: unifacial 'choppers', type A i, from Terrace 2. *See page 69*





A. *Guler: unifacial 'chopper', type A ii, from Terrace 2. See page 69*





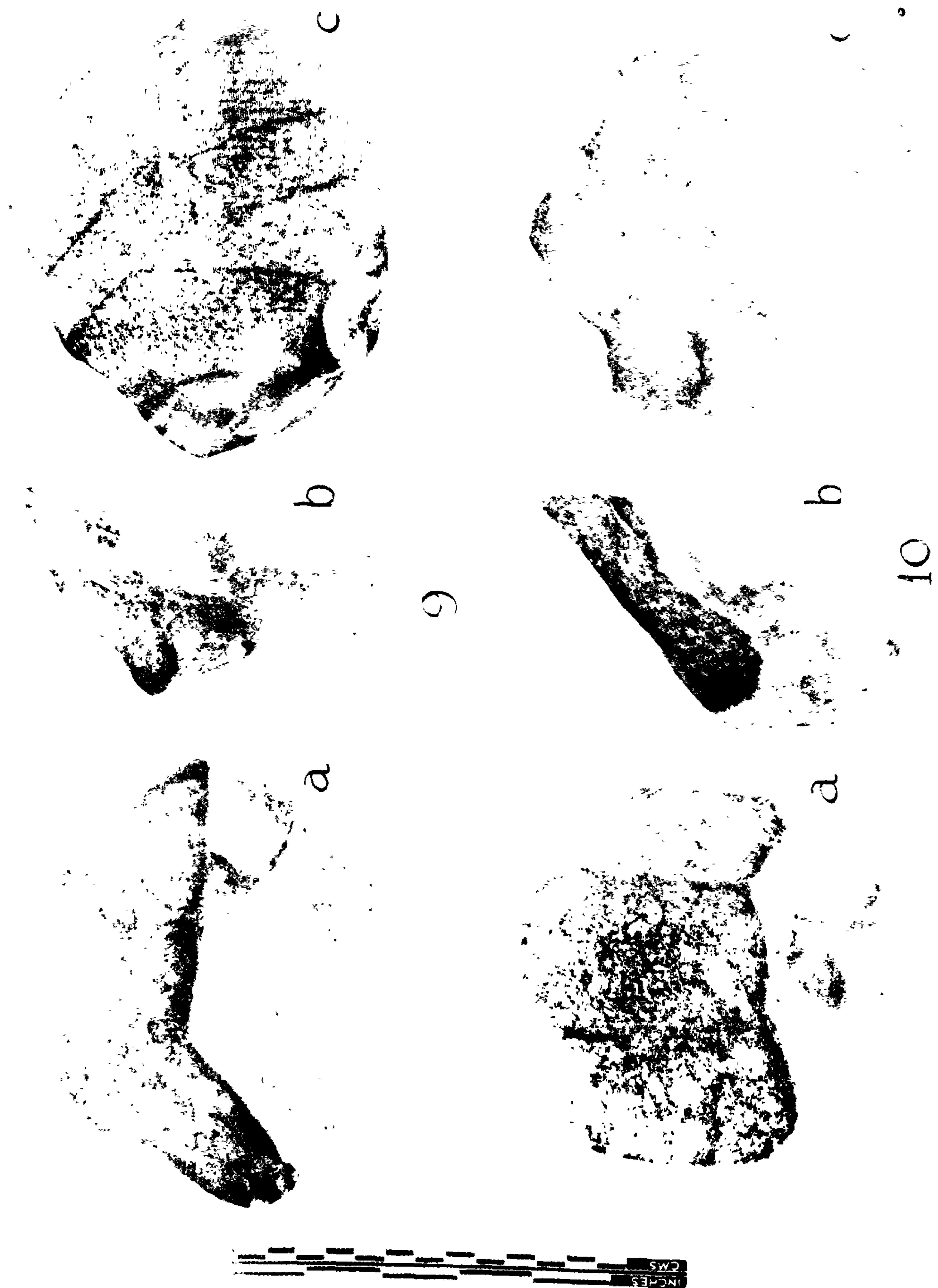
B. *Guler: unifacial 'chopper', type A ii, from Terrace 3. See page 69*



A. *Guler: unifacial 'chopper', type A ii, from Terrace 3. See page 69*



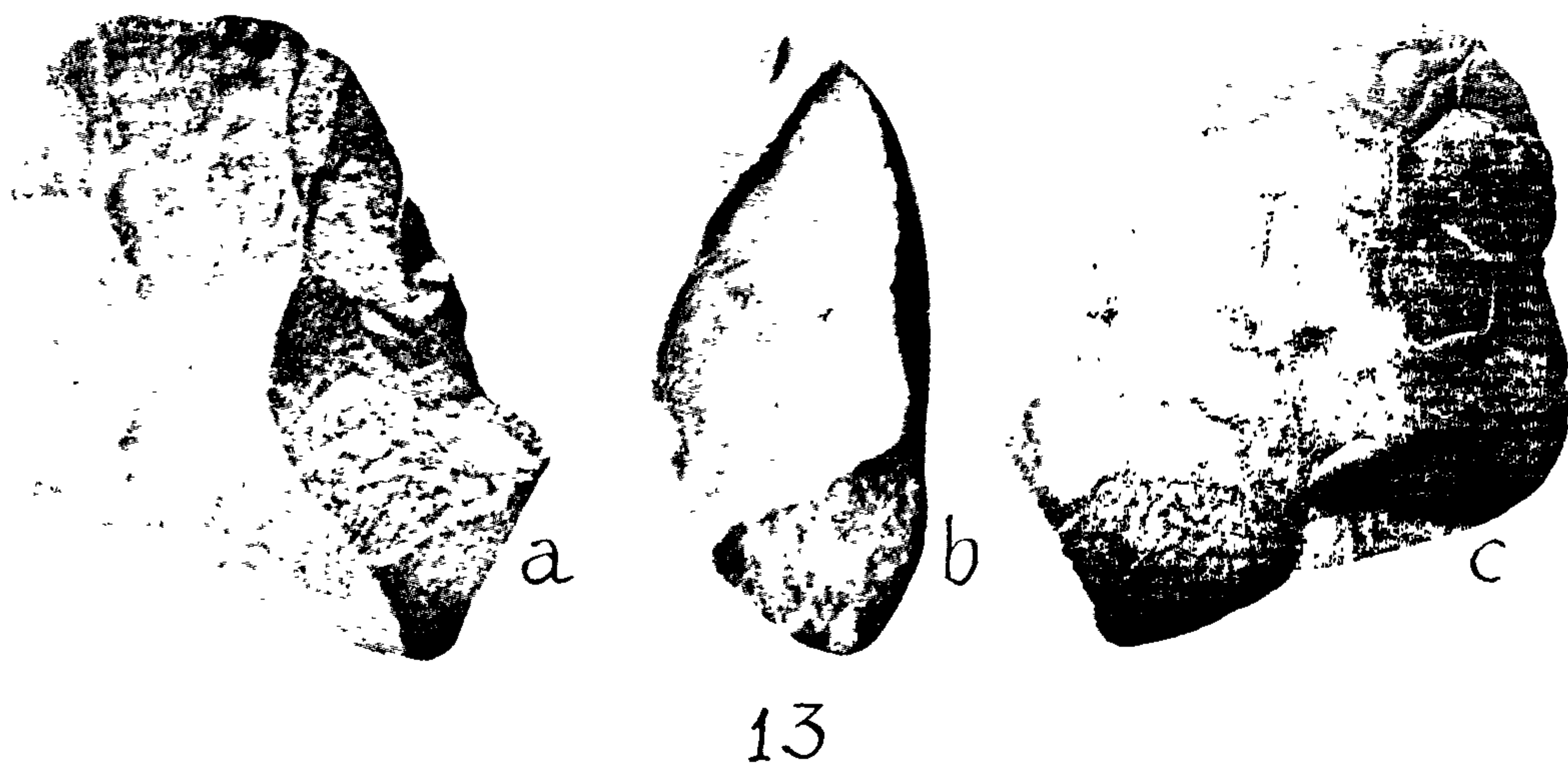
B. *Guler: unifacial 'chopper', type A iii, from Terrace 1. See page 69*



Guler: unifacial 'chopper', type A iii, from Terrace 2. *See page 69*



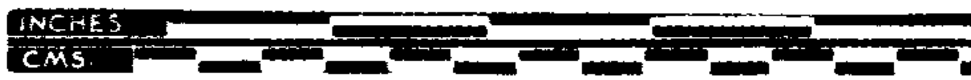
Guler: unifacial 'choppers', type A iii, from Terrace 2 or 3. *See page 70*





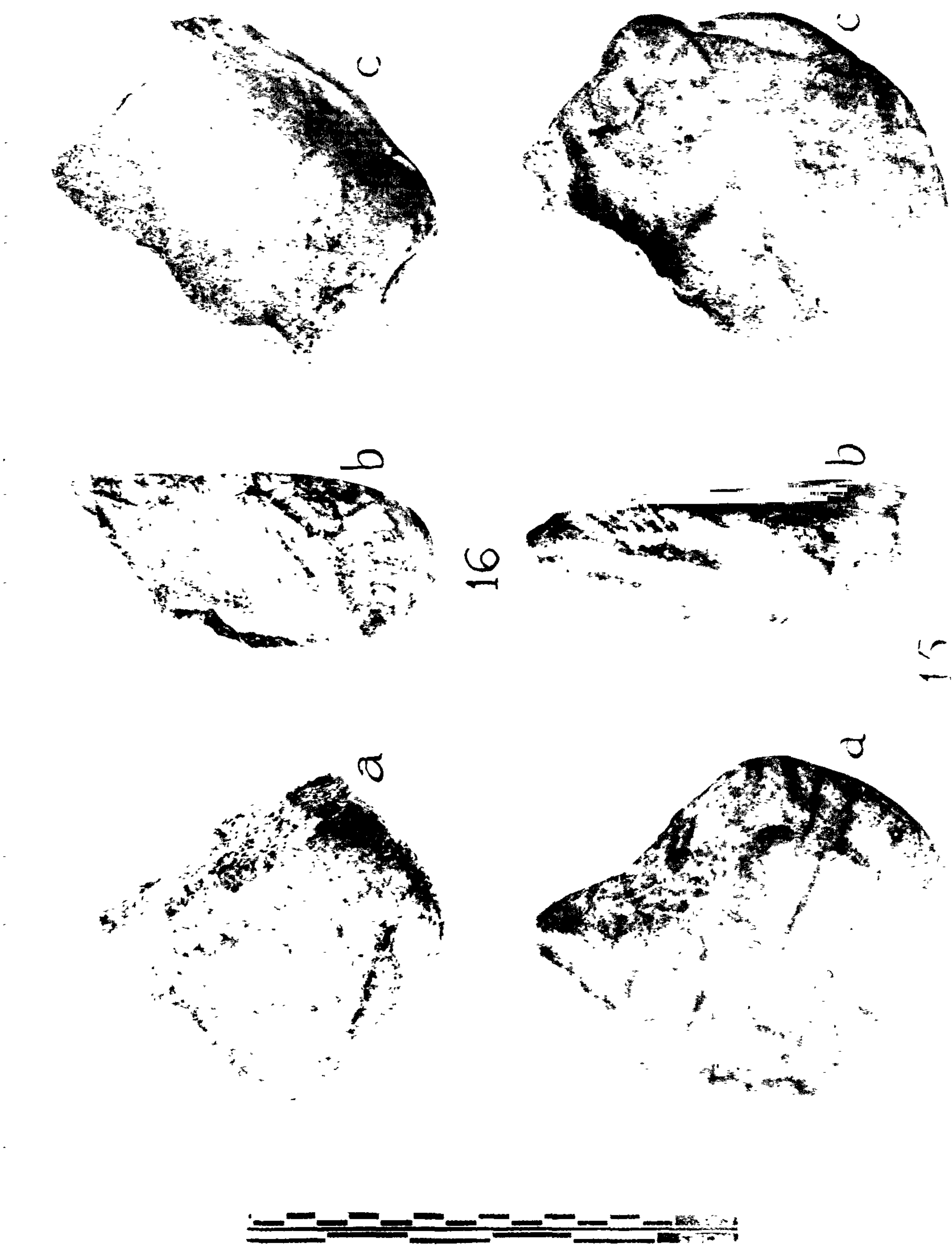
A. *Guler: unifacial 'chopper', type A iv, from Terrace 2 or 3.* *See page 70*



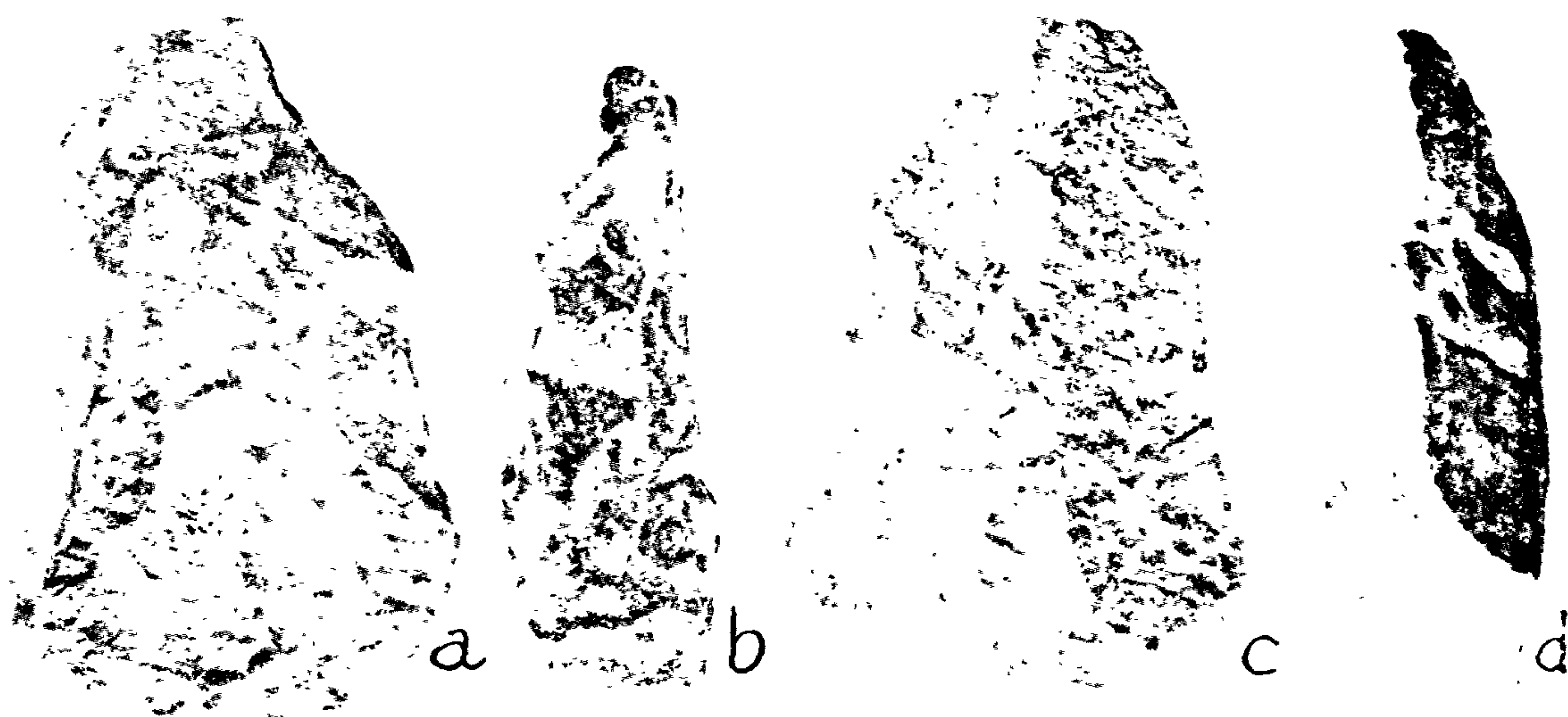


B. *Guler: bifacial 'chopping-tool', type B ii, from Terrace 1.* *See page 70*

To face plate XXXI



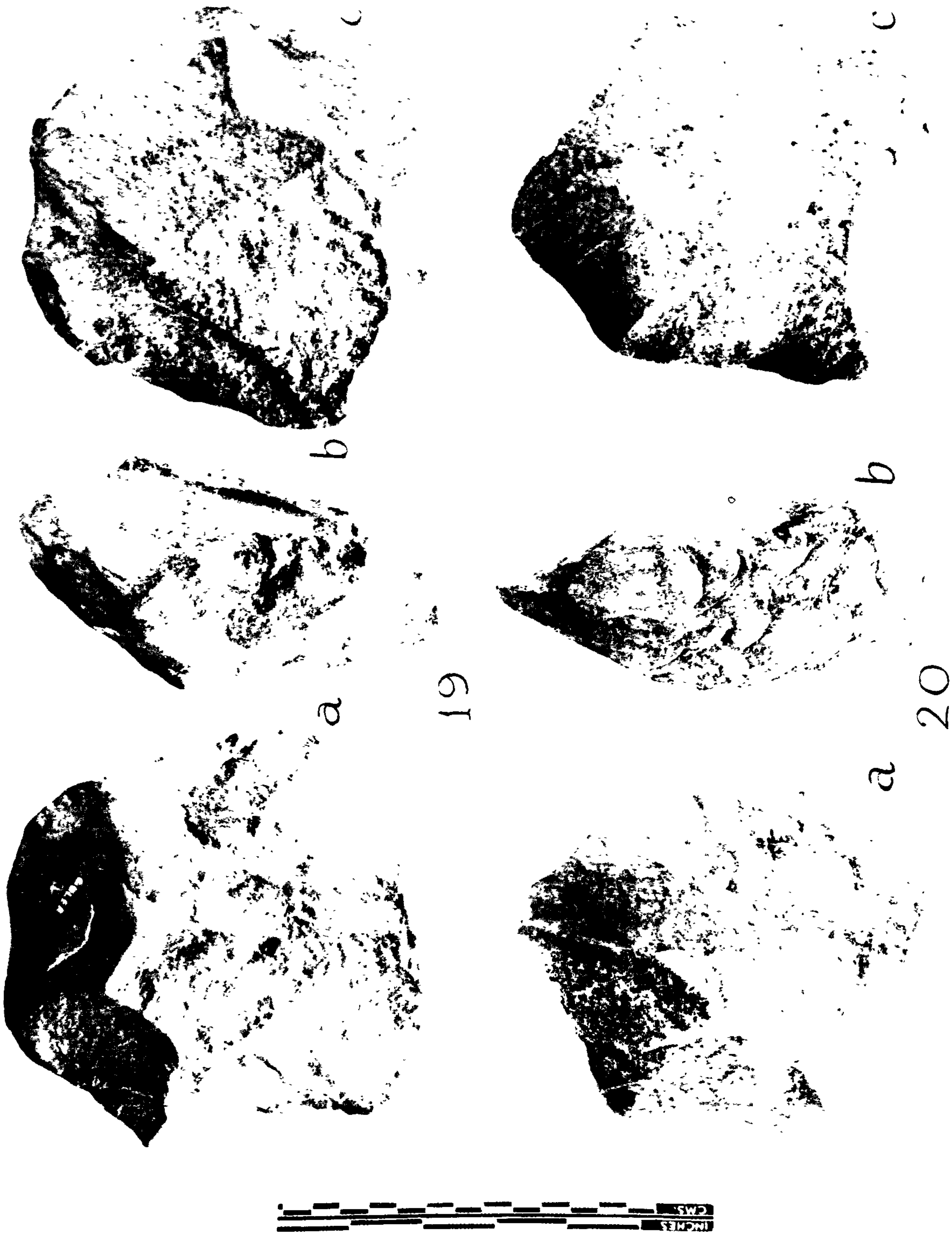
Guler: 'pebble handaxes', type C; 15, from Terrace 2, and 16, from Terrace 2 or 3. *See page 70*



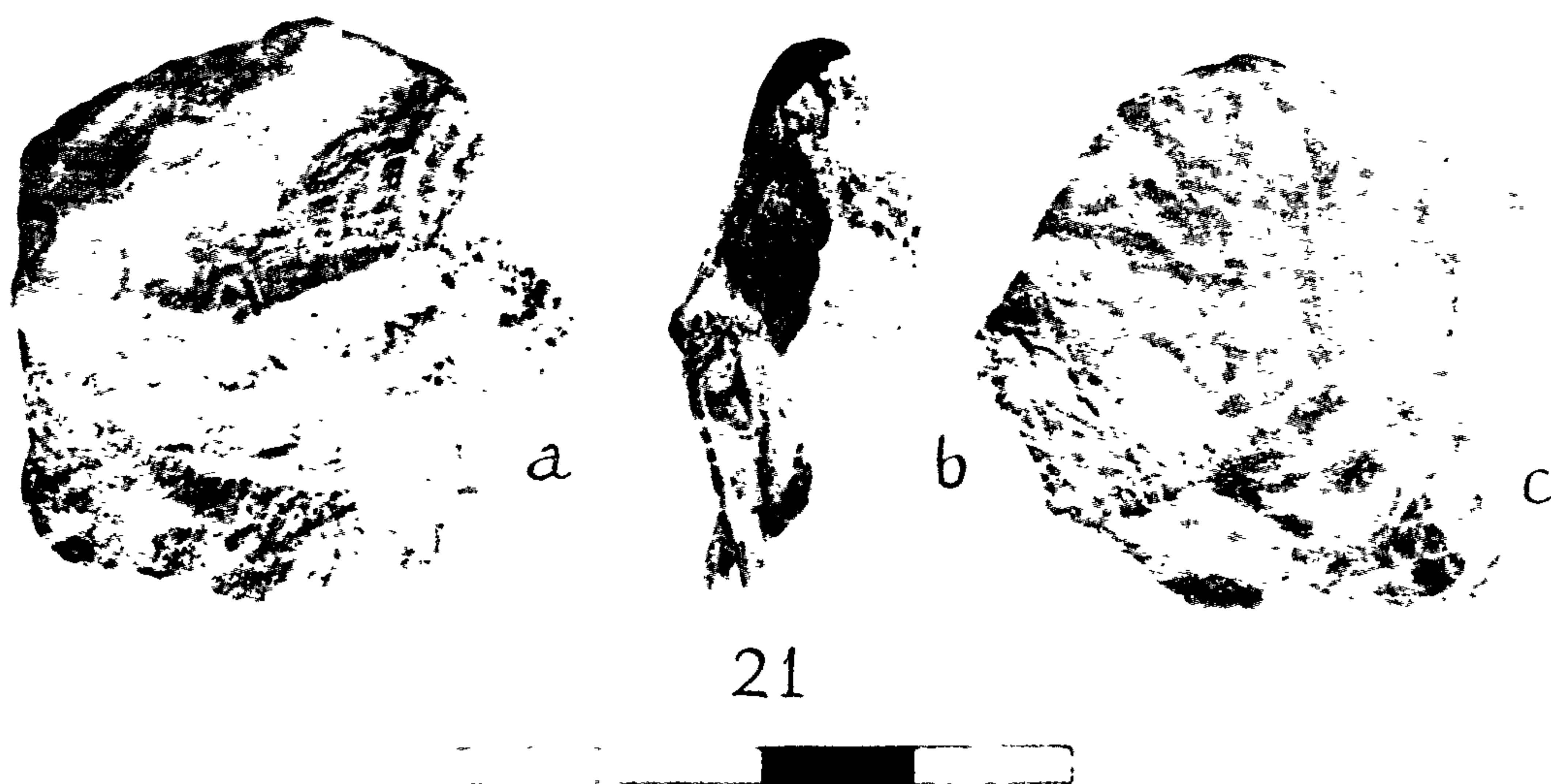




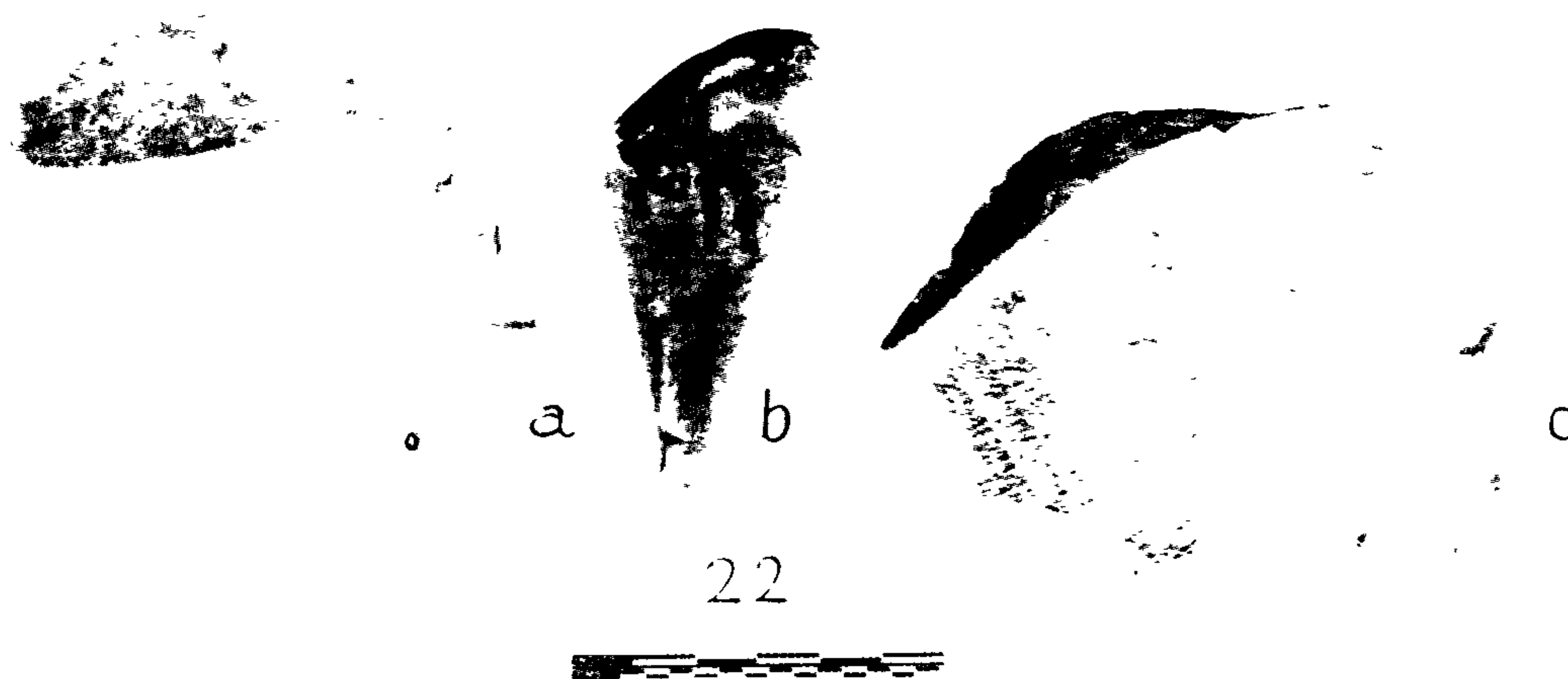
Guler: handaxes, 17, type D i, and 18, type D ii, both from Terrace 2 or 3. *See page 70*



Guler: discoidal cores, type E i, from Terrace 2 or 3. *See page 70*



A. *Guler: discoidal core, type E i, from Terrace 2 or 3. See page 70*

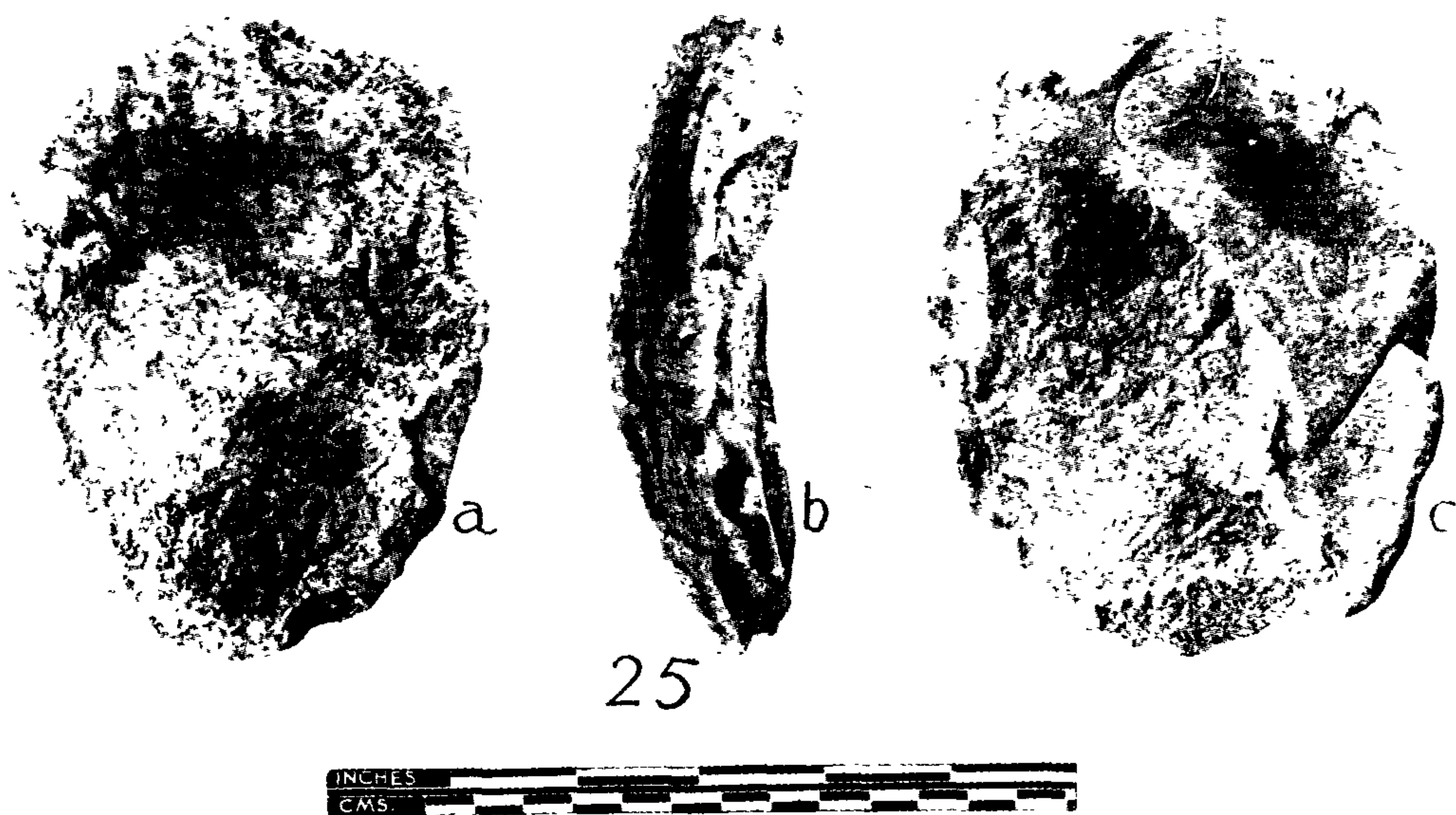


B. *Guler: Clactonian flake, type F i, from Terrace 1. See page 70*

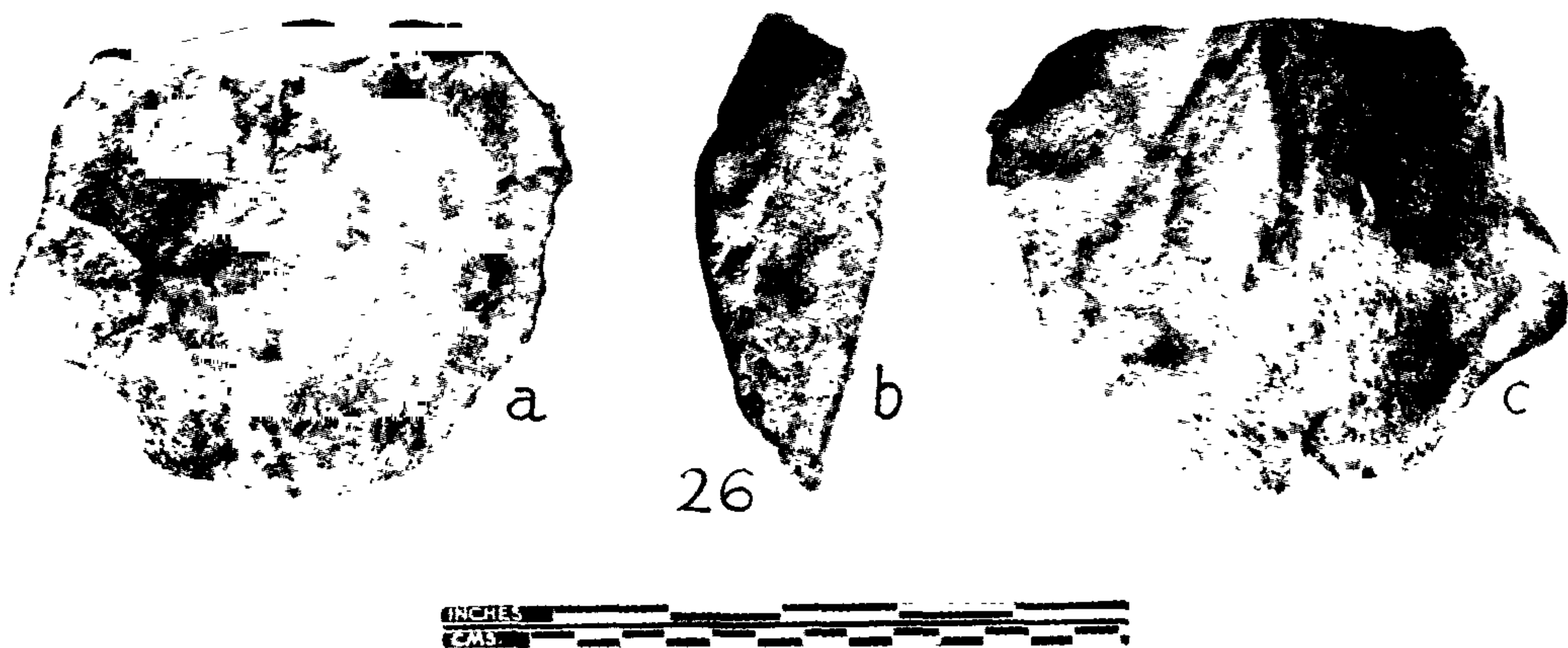
To face plate XXXV



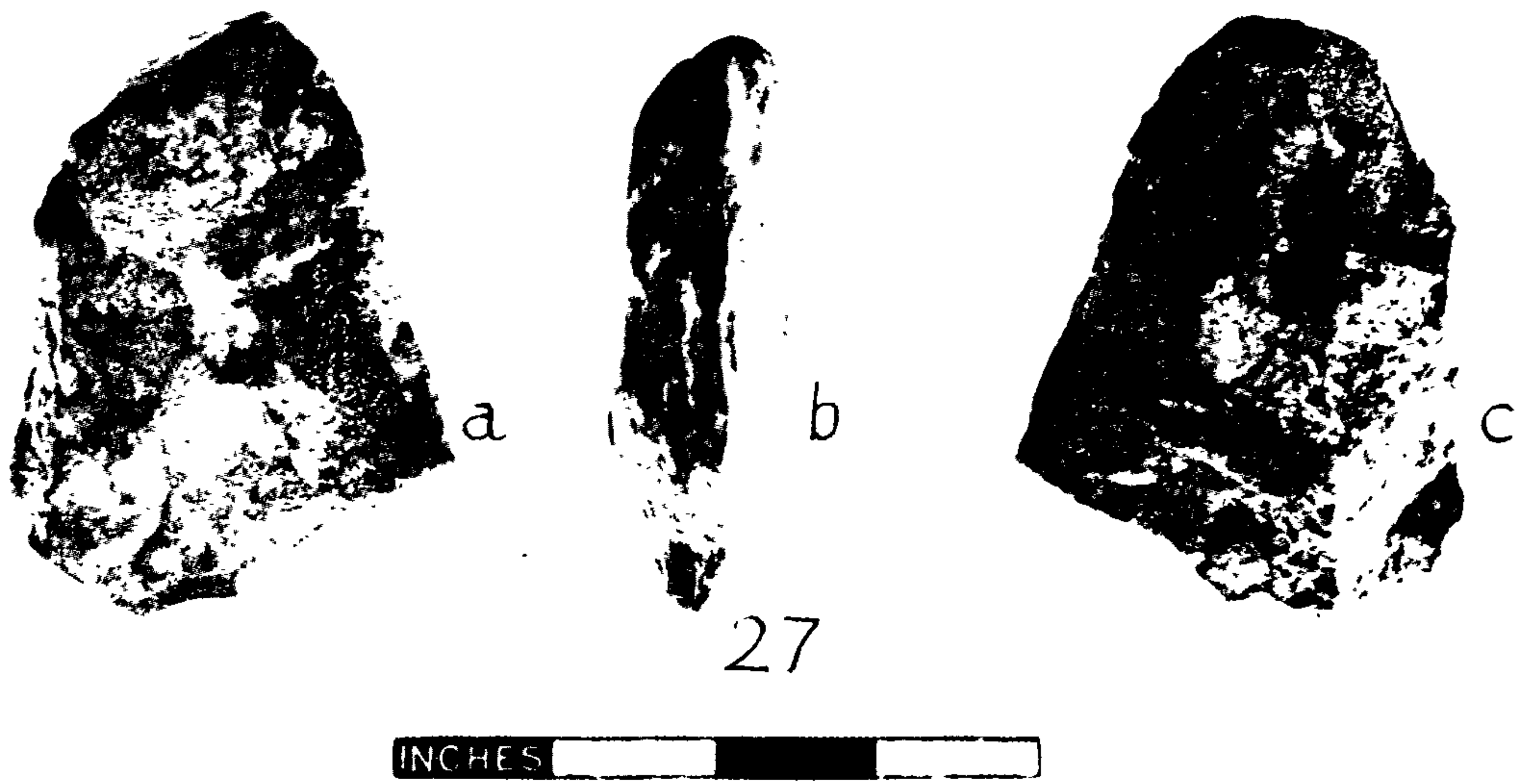
Guler: Clactonian flakes, 23, type F i, and 24, type F ii, both from Terrace 2. *See page 71*



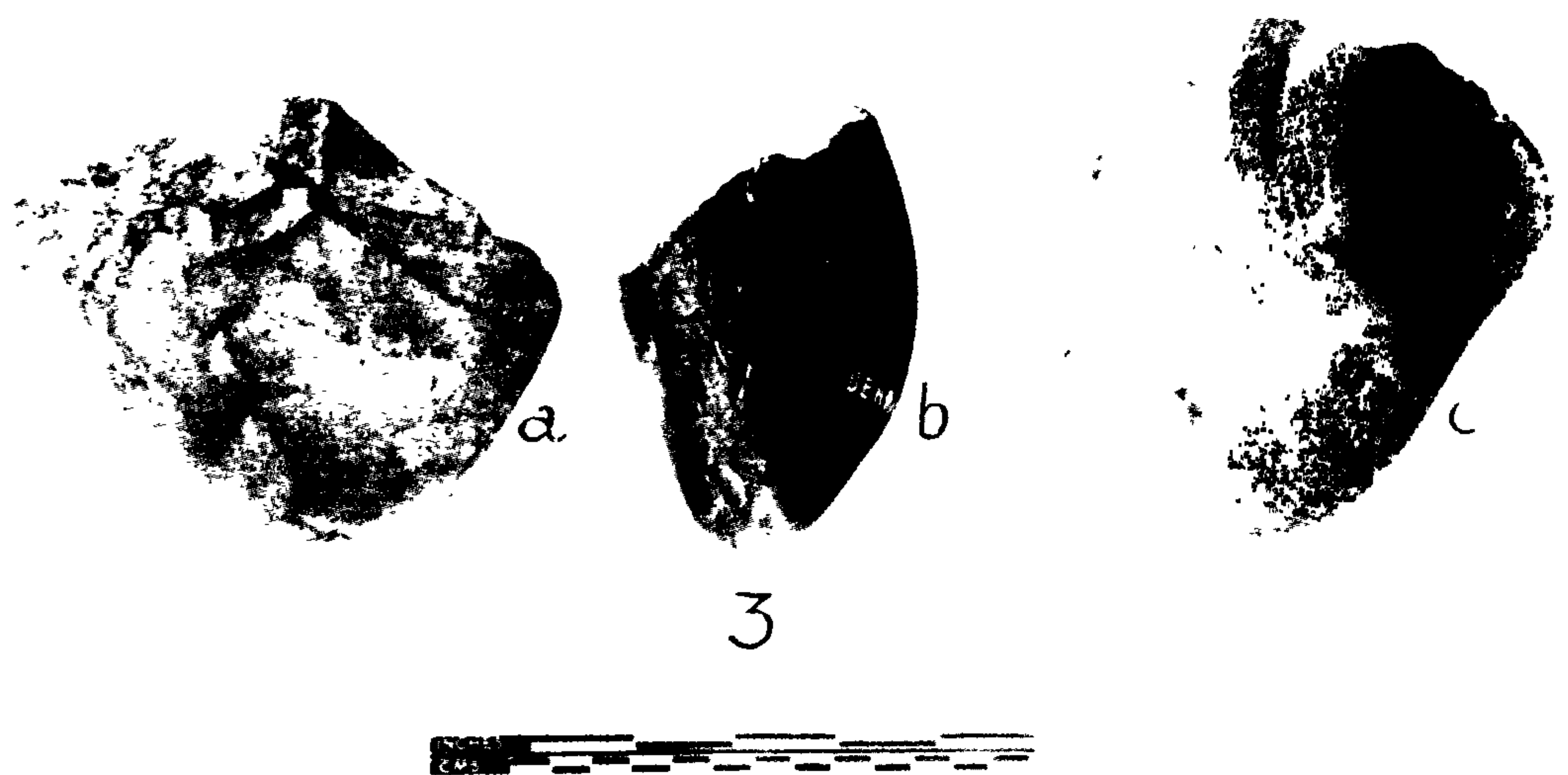
A. *Guler: proto-Levalloisean flake, type F iii, from Terrace 2. See page 71*



B. *Guler: proto-Levalloisean flake, type F iii, from Terrace 2. See page 71*



A. *Guler: proto-Levalloisian flake, type F iv, from Terrace 2 or 3.* *See page 71*



B. *Dehra: unifacial 'chopper', type A ii.* *See page 81*

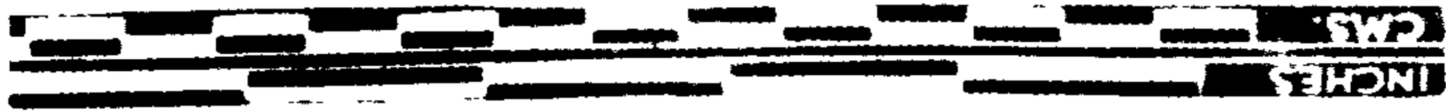


Dehra: unifacial 'choppers', type A i. *See page 81*

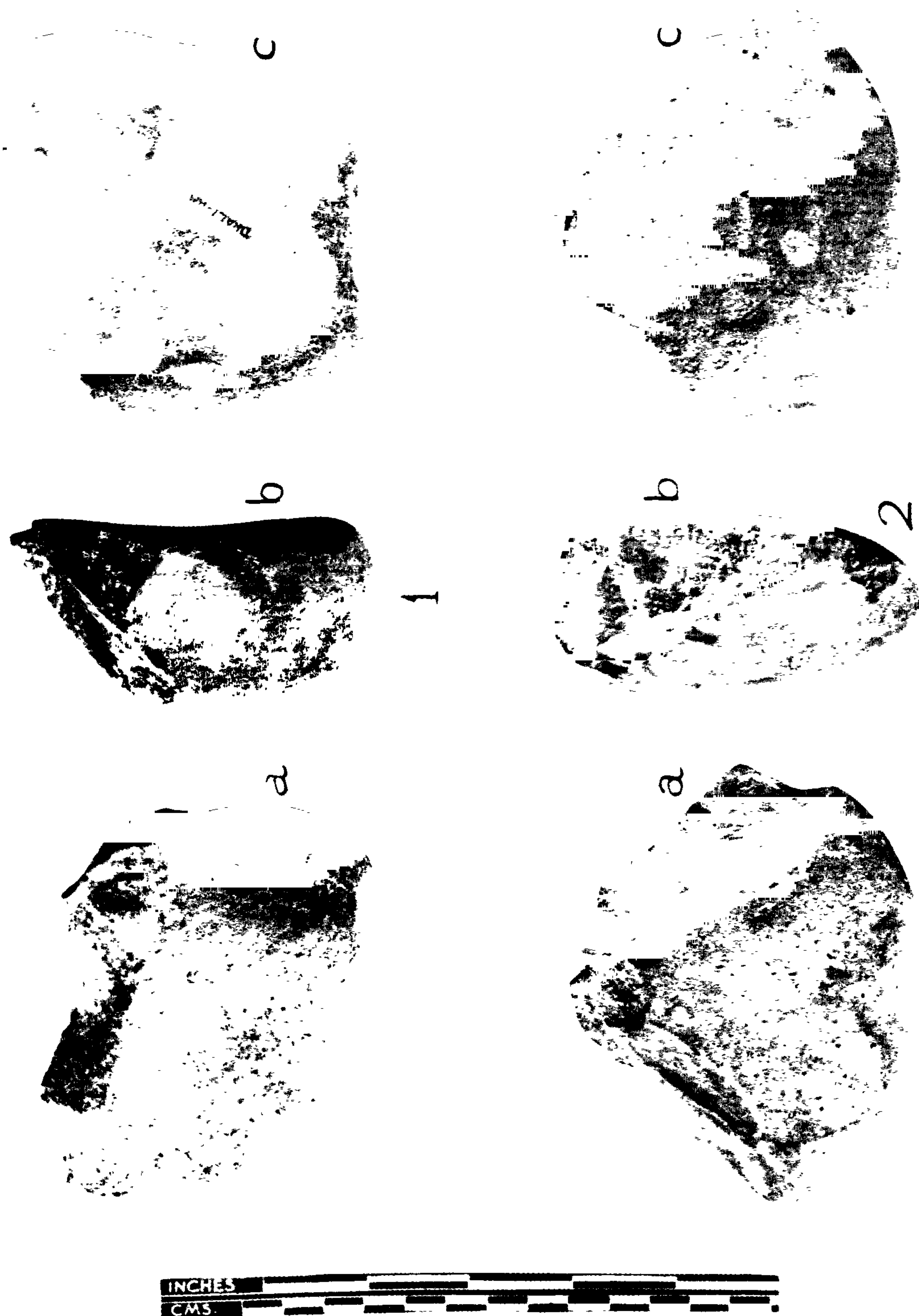
To face plate XXXIX





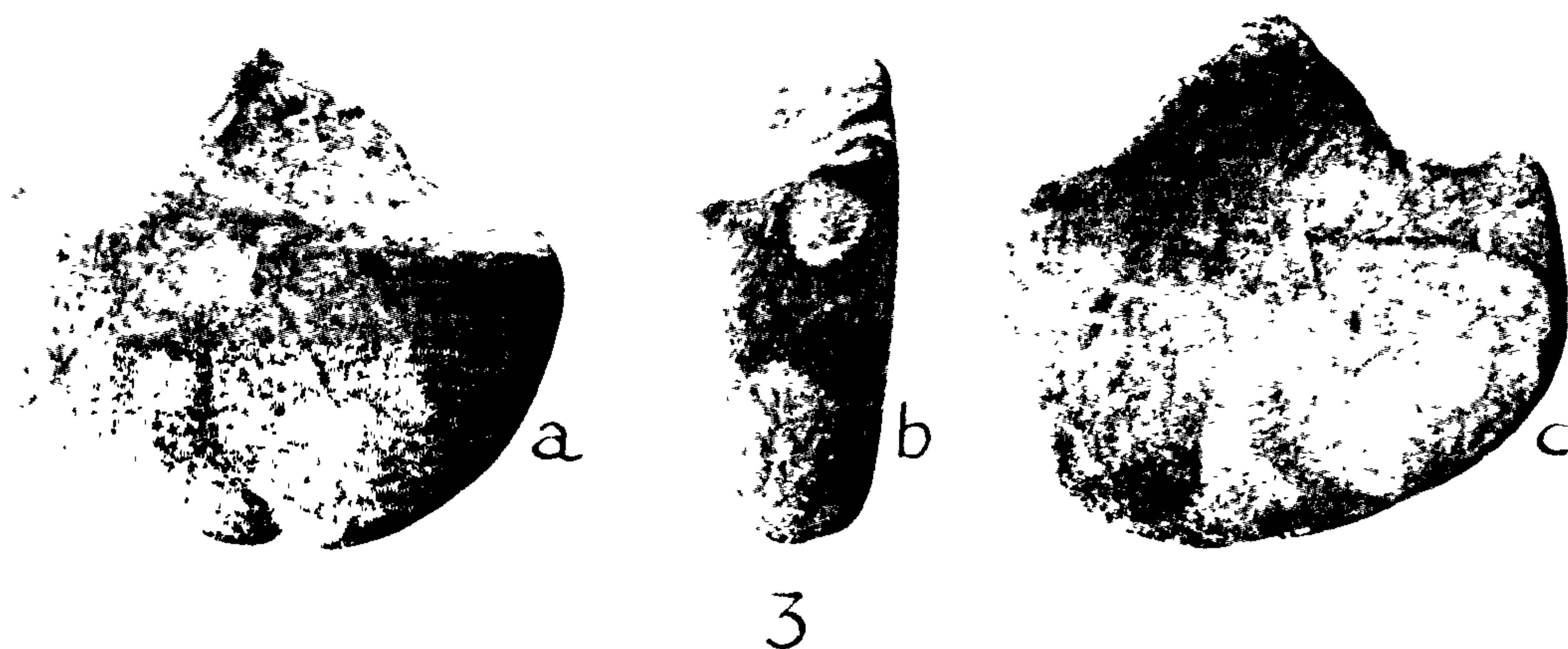


Dehra: unifacial 'chopper', type A iii. See page 81



Dhaliara: unifacial 'choppers', 1, type A i, and 2, type A iii. *See pages 81 and 85*

To face page 71





A. *Dhaliara: 'pebble handaxe', type C. See page 85*



B. *Kangra: 'pebble handaxe', type C. See page 85*

also are the radial lines. The angle between the flake-surface and the platform, which is the cortex itself, is about 120°. Though there is no secondary retouch, the edge bears some batter-marks suggesting that the specimen may have been used as a tool. From locality A; Terrace 1.

23. Clactonian flake: type F i. The non-flaked side retains the original cortex. From locality E; Terrace 2.

24. Clactonian flake; type F ii. Its edges are partly retouched. The non-flaked side retains the original cortex. From locality C; Terrace 2.

25. Proto-Levalloisean flake: type F iii. Roughly oval in outline, it has partly-retouched edges. From locality H; Terrace 2.

26. Proto-Levalloisean flake: type F iii. A part of the specimen is broken, perhaps through thermal action. There are traces of secondary working along the edge. Thus, the specimen is likely to have been used as a tool, maybe as a scraper. From locality D; Terrace 2.

27. Proto-Levalloisean flake: type F iv. It is an oblong flake as against nos. 25 and 26, which are roughly oval. One of the edges (the right one in illustration 'a') is finely retouched, indicating that it may have been used as a side-scraper. Retouching is also noticed along the edge shown downwards in the illustration. From a gully near locality E; Terrace 2 or 3.

3. DEHRA

A. The site

About 24 miles south-south-east of Kangra, where the Kangra-Hoshiarpur road crosses the Beas, is located the little township of Dehra (31° 53′ N. Lat. and 76° 14′ E. Long.). It is approachable from either Kangra or Hoshiarpur, there being a bus-service between these places. While the construction of a bridge over the Beas is on the programme of the Government, at present the river has to be ferried across (pl. XXII B). The place has got an inspection-bungalow.

B. River-terraces

Flowing through the Siwaliks, the Beas has cut many a terrace, of which four could be identified in the vicinity of Dehra Gopipur (pl. XXI) within the course of a day that the author was there. Owing to lack of time no systematic survey on the lines of Guler could be carried out at Dehra. However, the few observations made may be recorded here.

The town of Dehra stands on a terrace, which is about 115 ft. above the level of the river. The police-station with the bazar in front may be treated as the central point for this terrace. As one moves along the road towards Kangra, about a furlong from the police-station, one comes to the foot of a terrace which rises to a considerable height, may-be over 200 ft. (not measured) from the level of the Dehra town. Palaeoliths were discovered from a thick gravel-bed constituting a part of this terrace (pl. XXII A).

On the Gopipur side of the river was noticed a terrace which appeared to be higher than the one just described. However, as the time at disposal was very limited, the height, extent, etc., of these terraces could not be worked out.

C. The tools (figs. 13 and 14, *4* and *5*; pls. XXXVI B-XXXVIII)

During the short exploration only fourteen palaeoliths were collected. Of them, ten are unifacial 'choppers', divisible into types A i (two), A ii (five) and A iii (three),

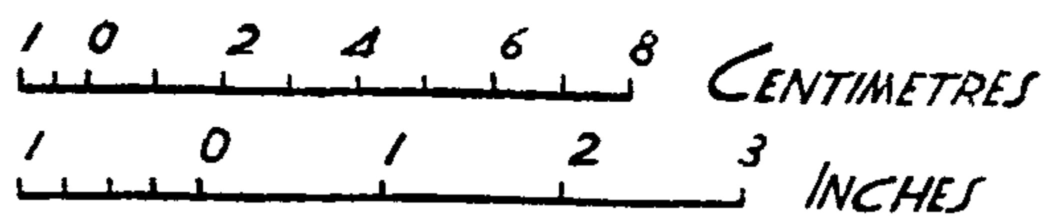
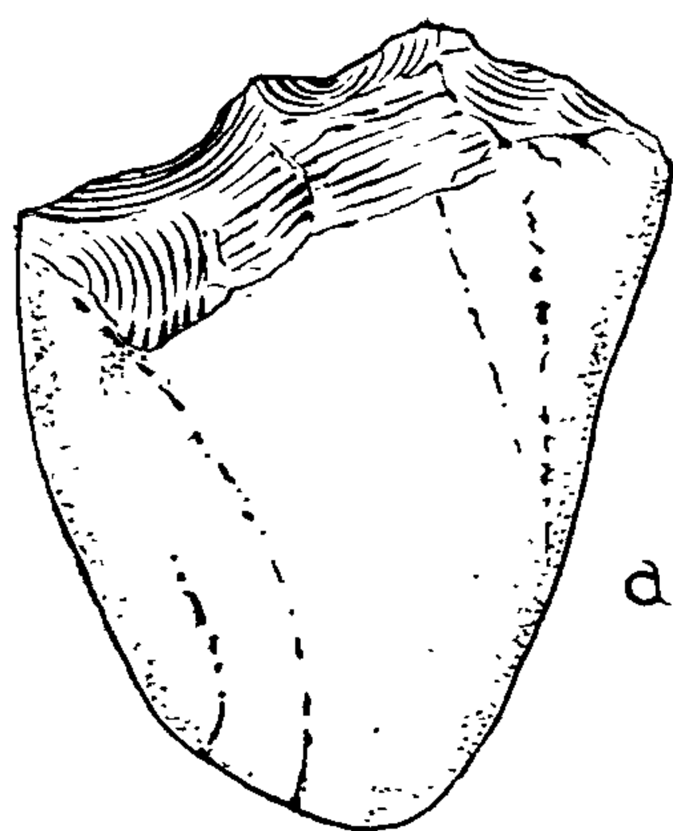
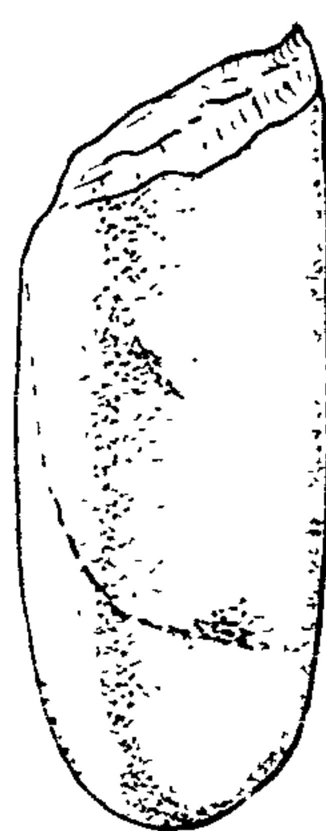
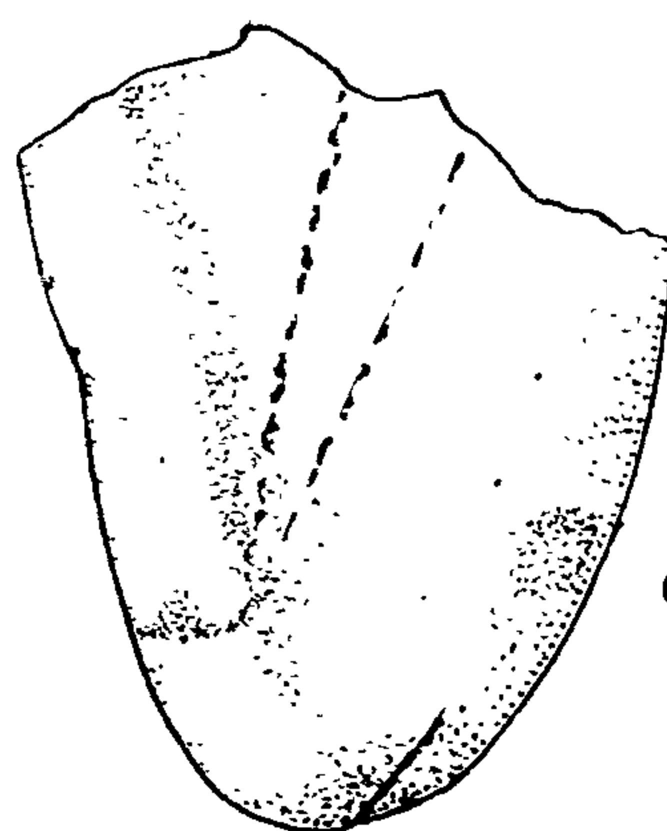


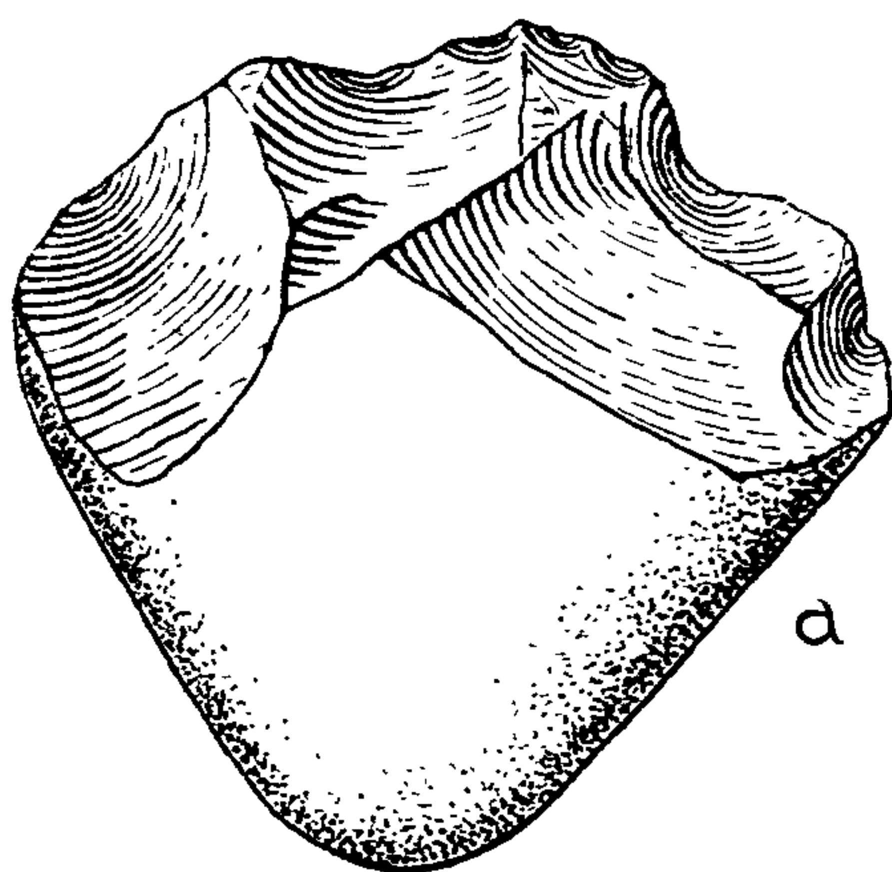
FIG. 4. *Guler: unifacial 'choppers', type A i; 1, from Terrace 1, and 2 and 3, from Terrace 2*

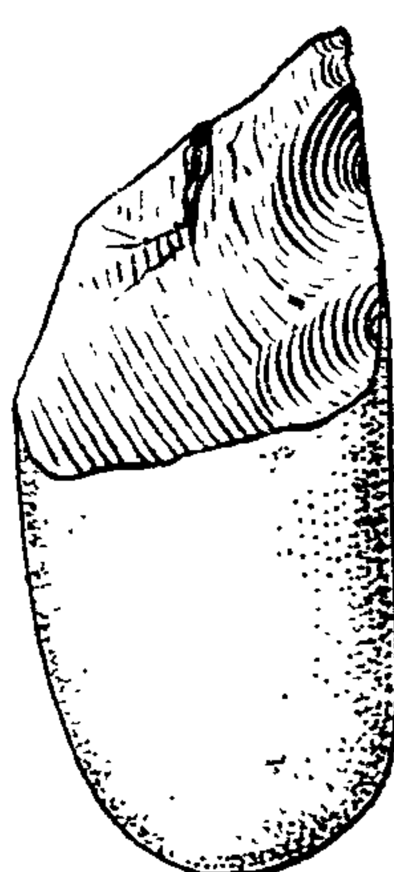


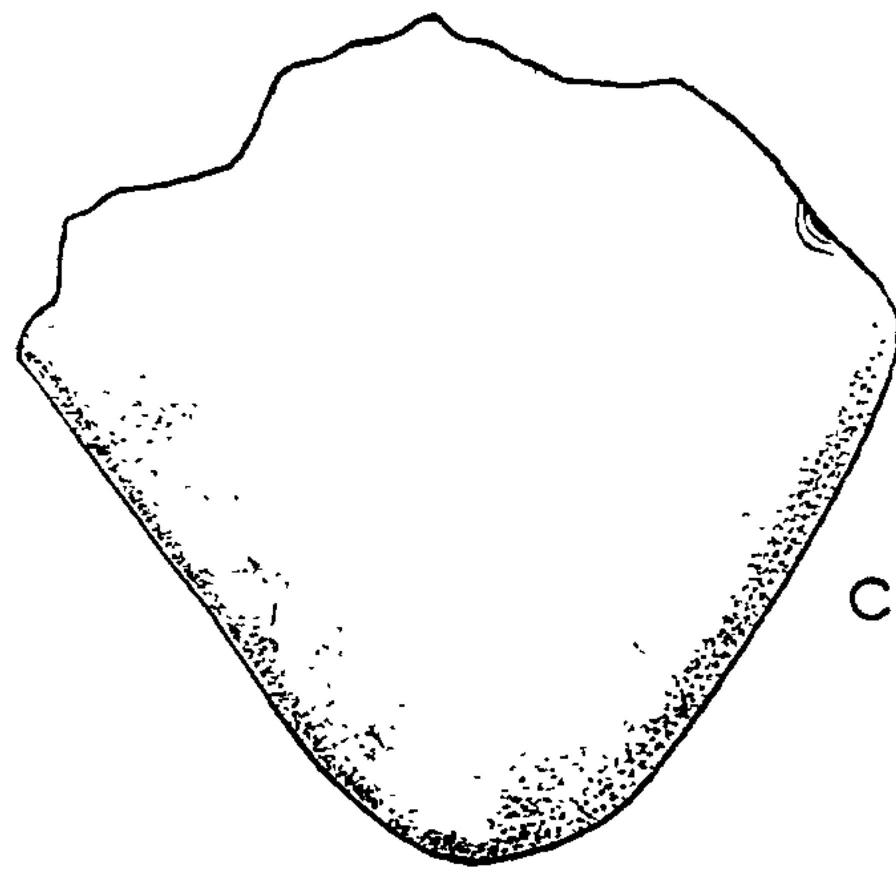




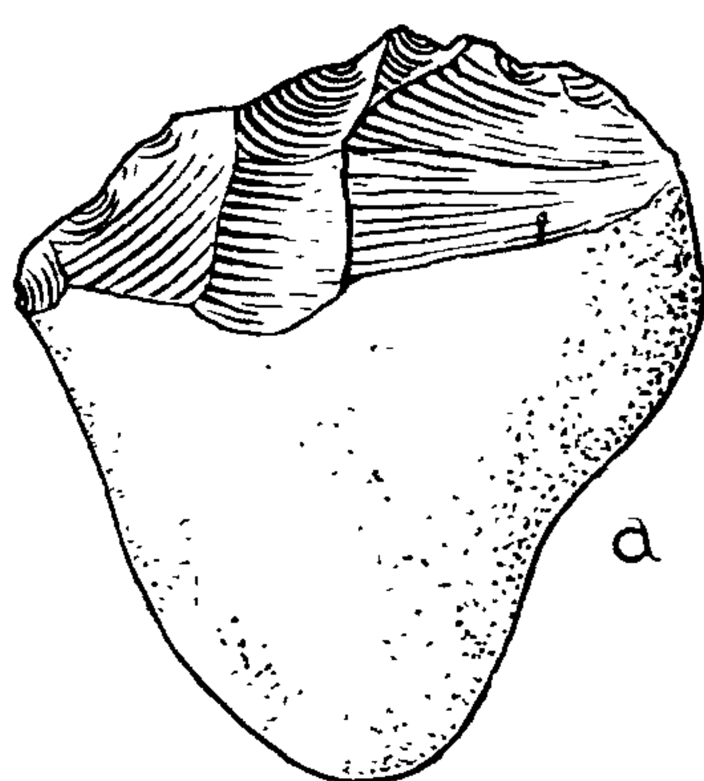
4

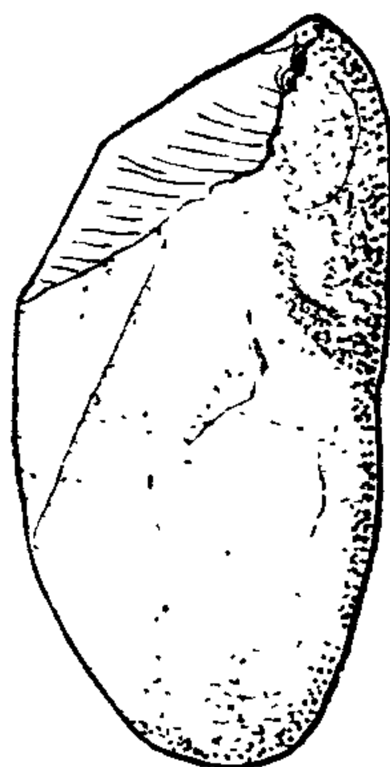


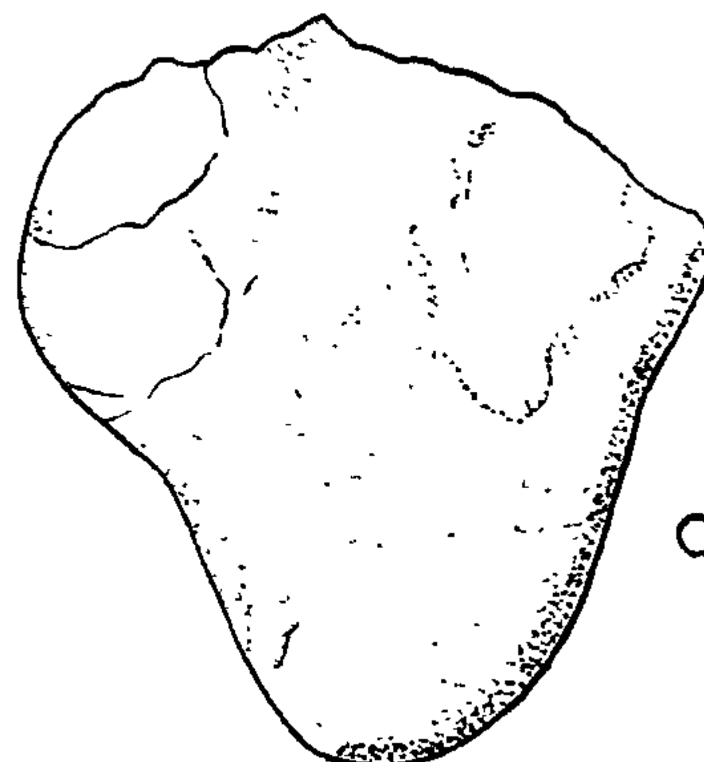




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6

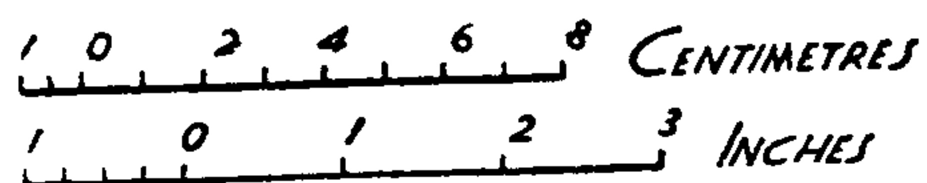
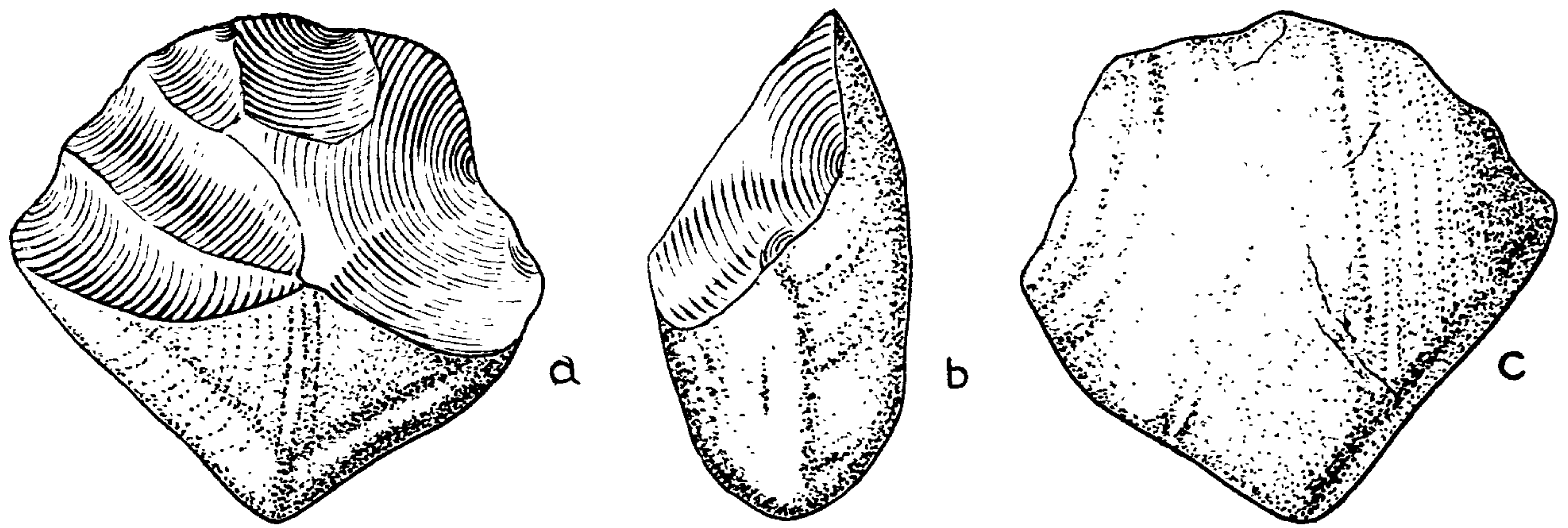
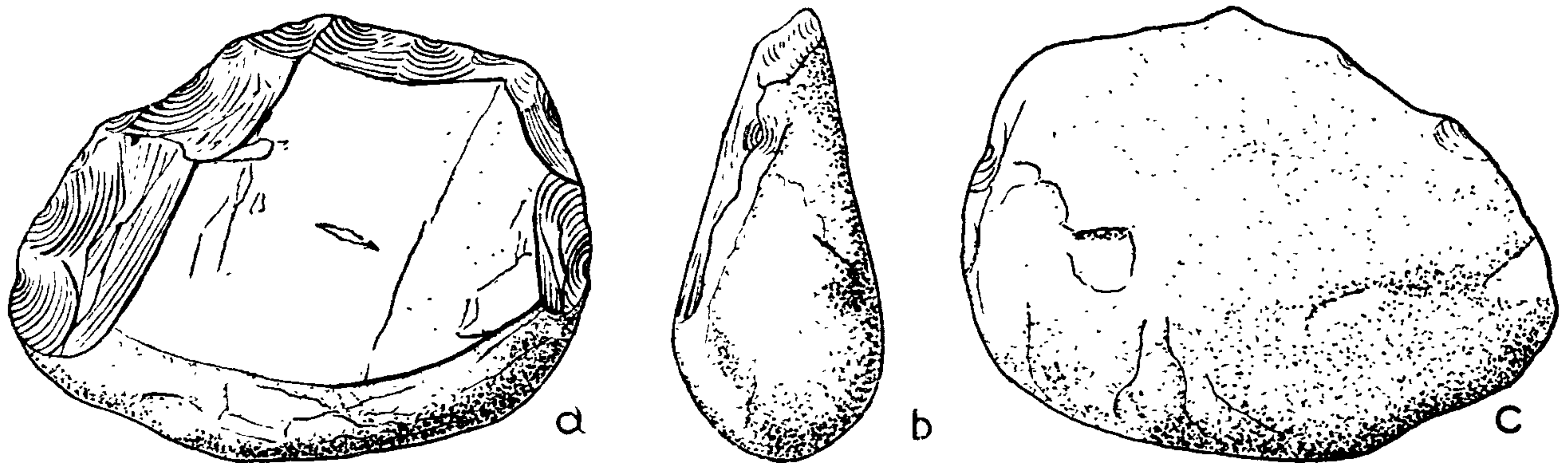
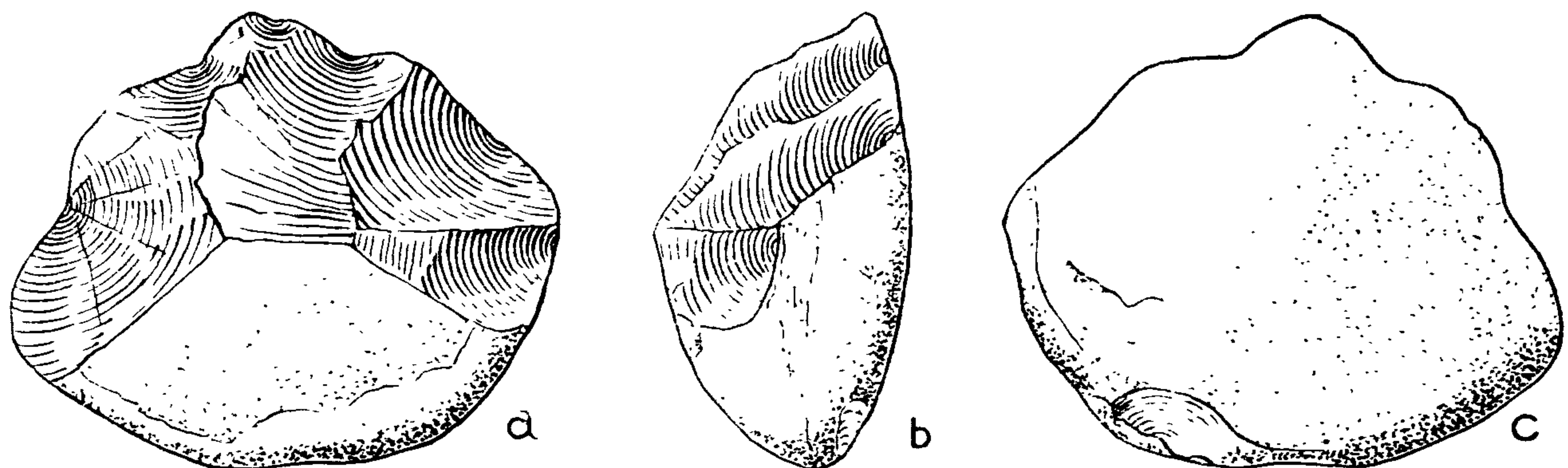


FIG. 5. *Guler: unifacial 'choppers'; 4, type A i, Terrace 2 or 3, 5, type A ii, Terrace 2, 6, type A ii, Terrace 3*







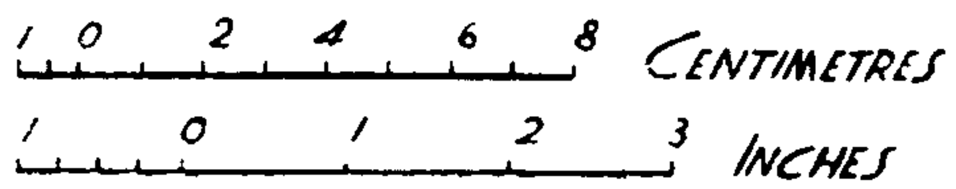
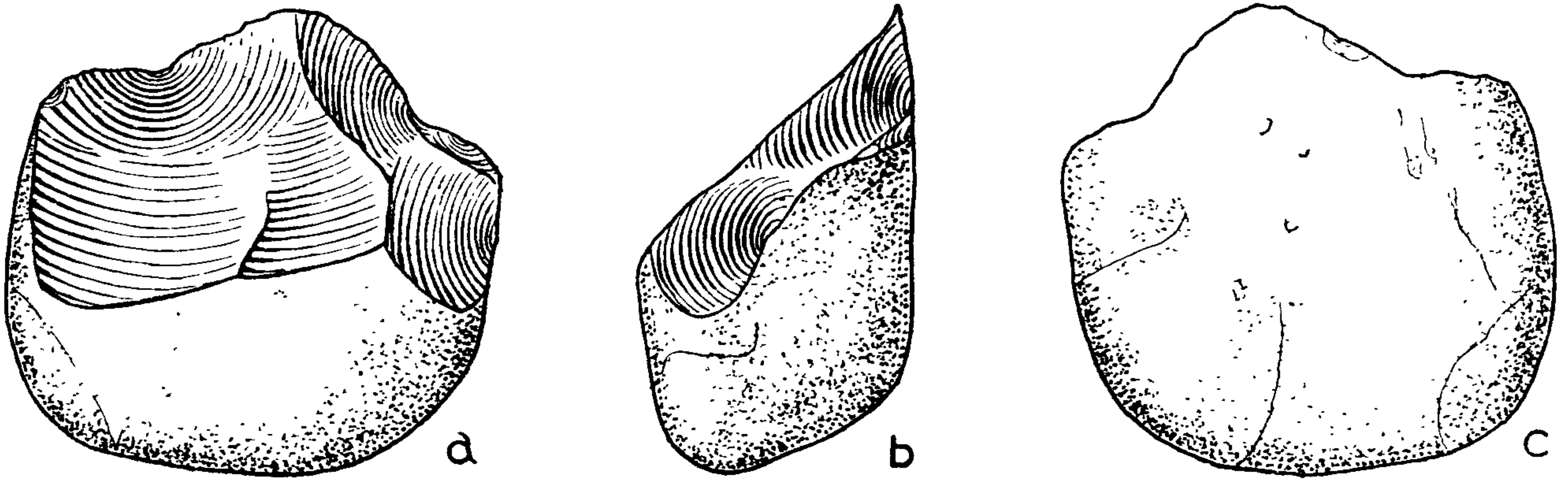
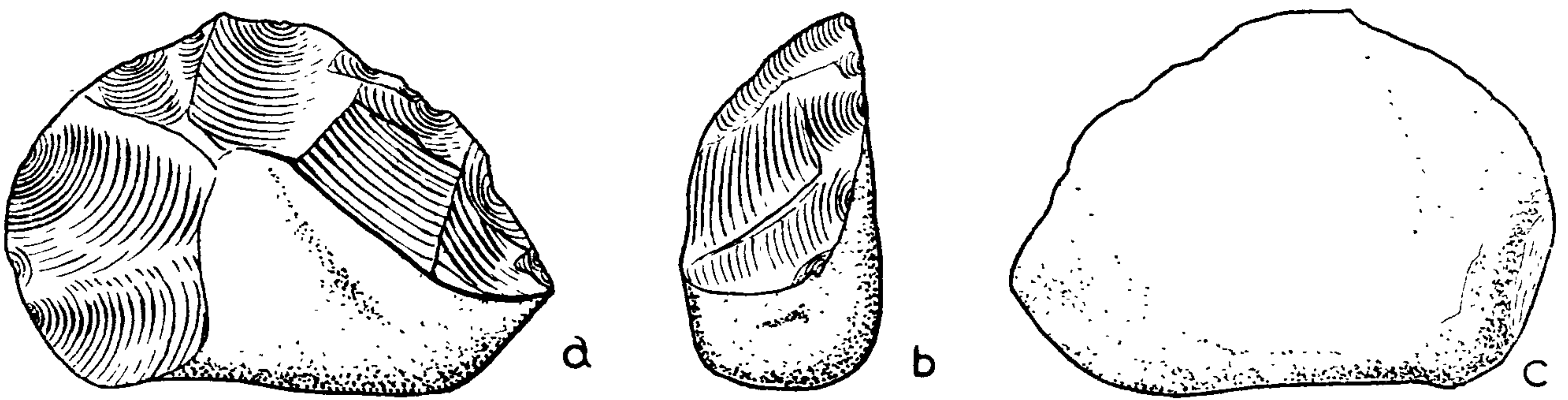


FIG. 6. *Guler: unifacial 'choppers'; 7, type A ii, Terrace 3, 8, type A iii, Terrace 1, 9, type A iii, Terrace 2*





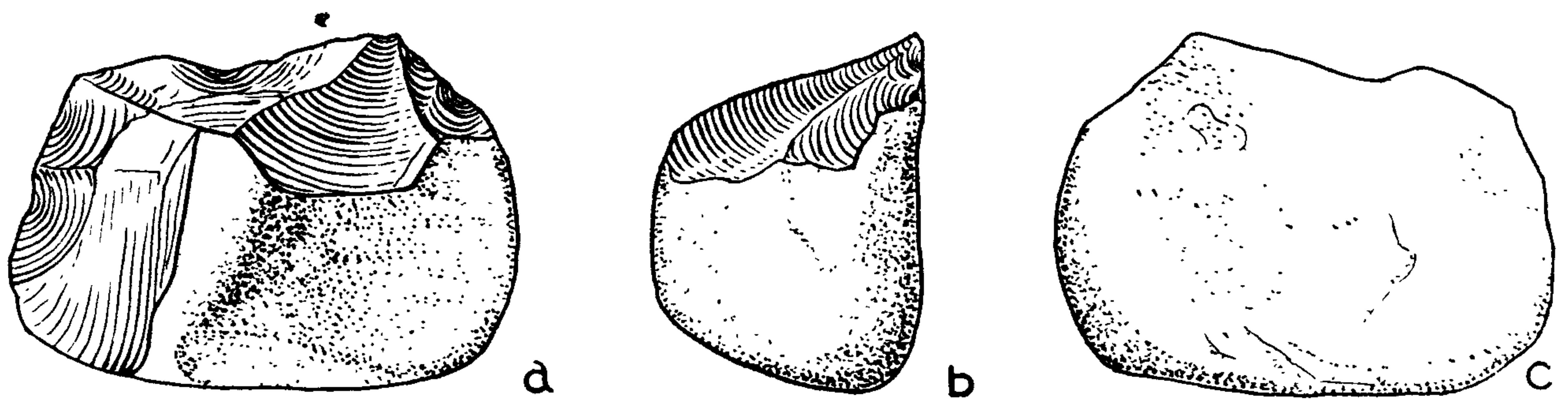
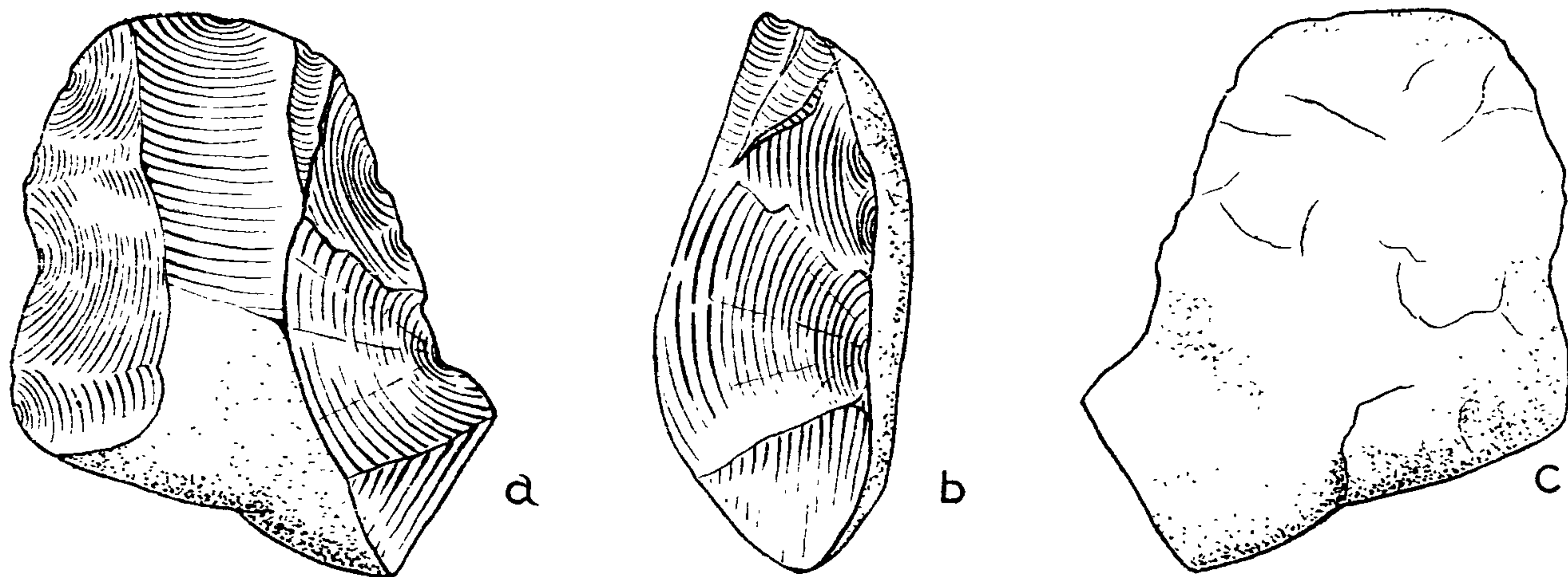
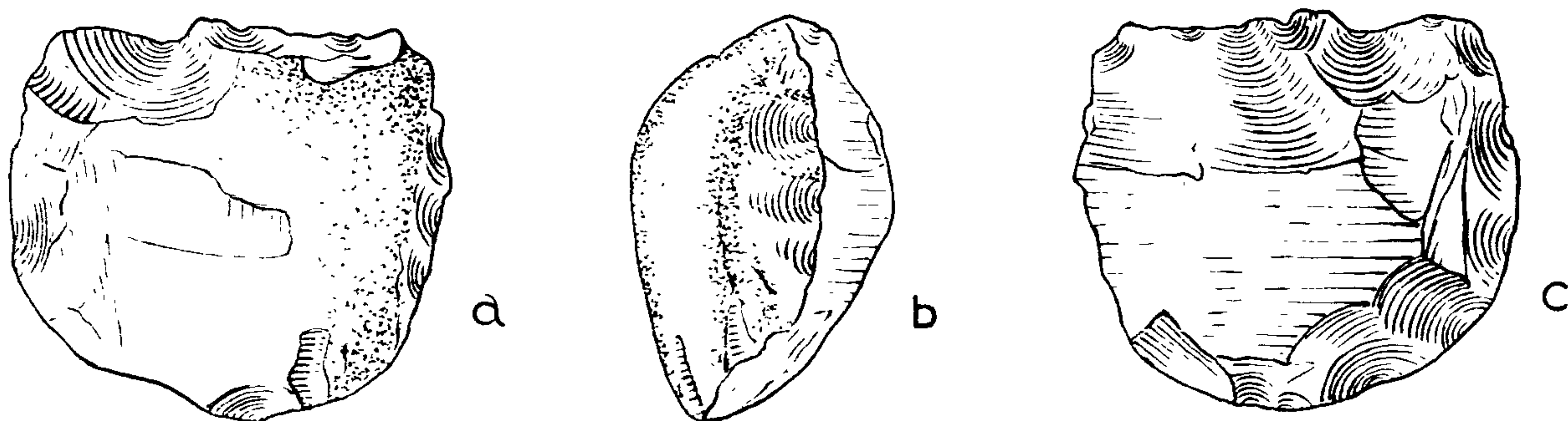




FIG 7. *Guler: unifacial 'choppers', type A iii; 10, from Terrace 2, and 11 and 12, from Terrace 2 or 3*





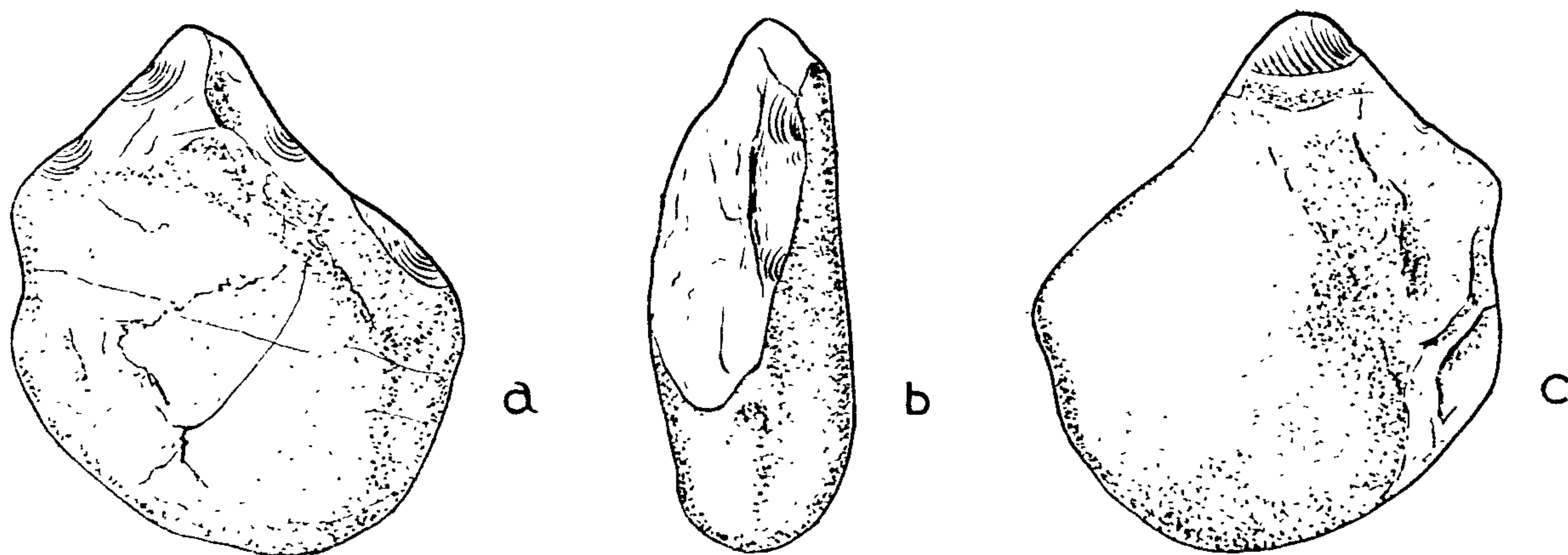




FIG. 8. *Guler: 13, unifacial 'chopper', type A iv, Terrace 2 or 3; 14, bifacial 'chopping-tool', type B ii, Terrace 1; 15, 'pebble handaxe', type C, Terrace 2*

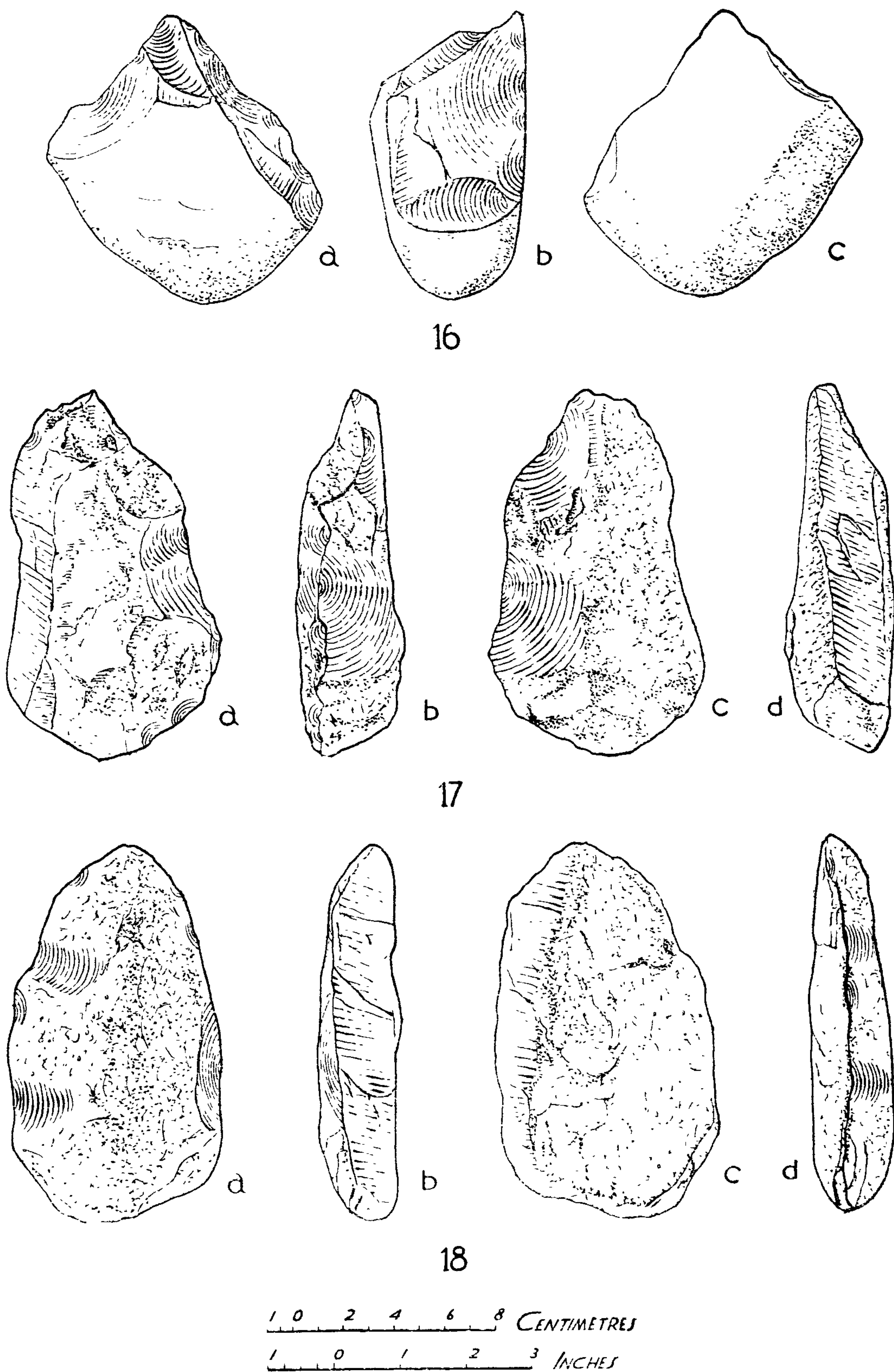
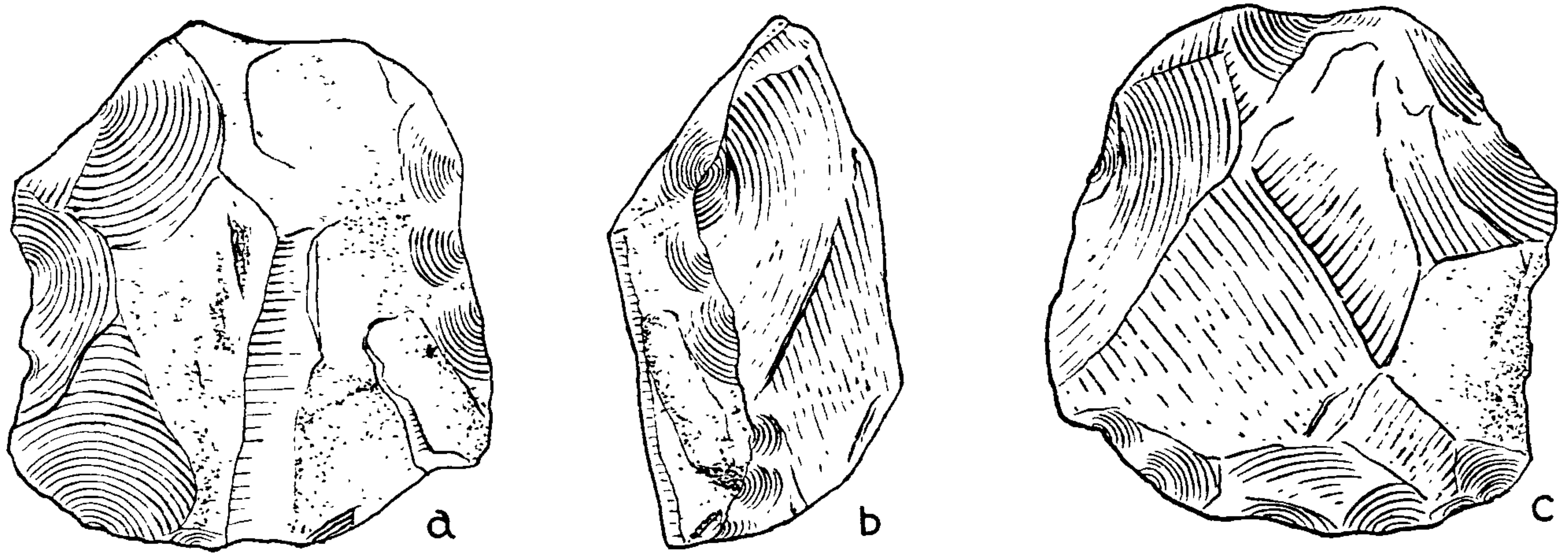
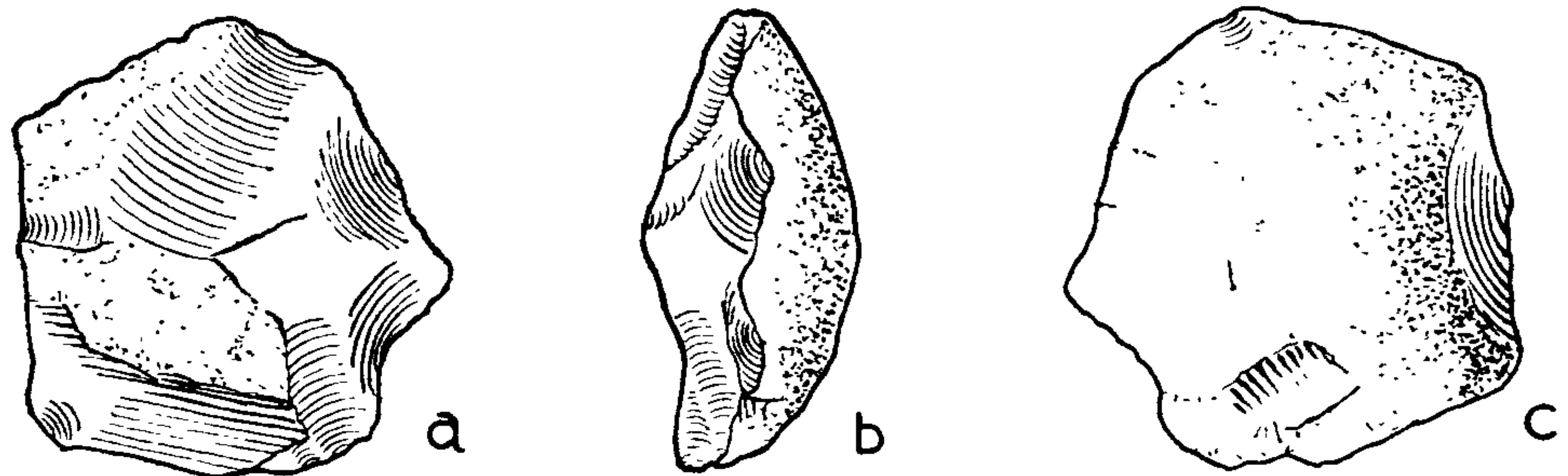
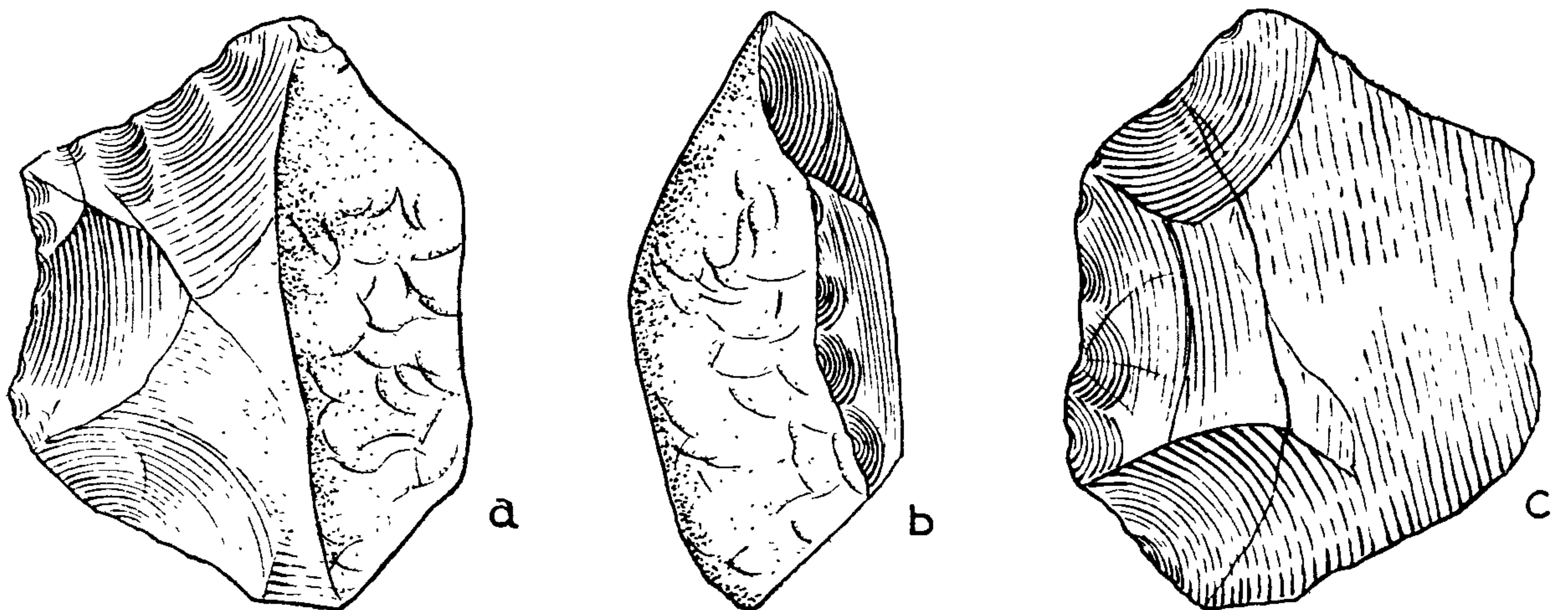


FIG. 9. *Guler: 16, 'pebble handaxe', type C, Terrace 2 or 3; 17, handaxe, type D i, Terrace 2 or 3; 18, handaxe, type D ii, Terrace 2 or 3*







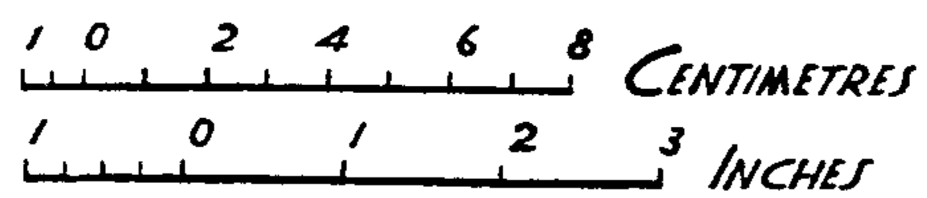


FIG. 10. *Guler: discoidal cores, type E i, Terrace 2 or 3*

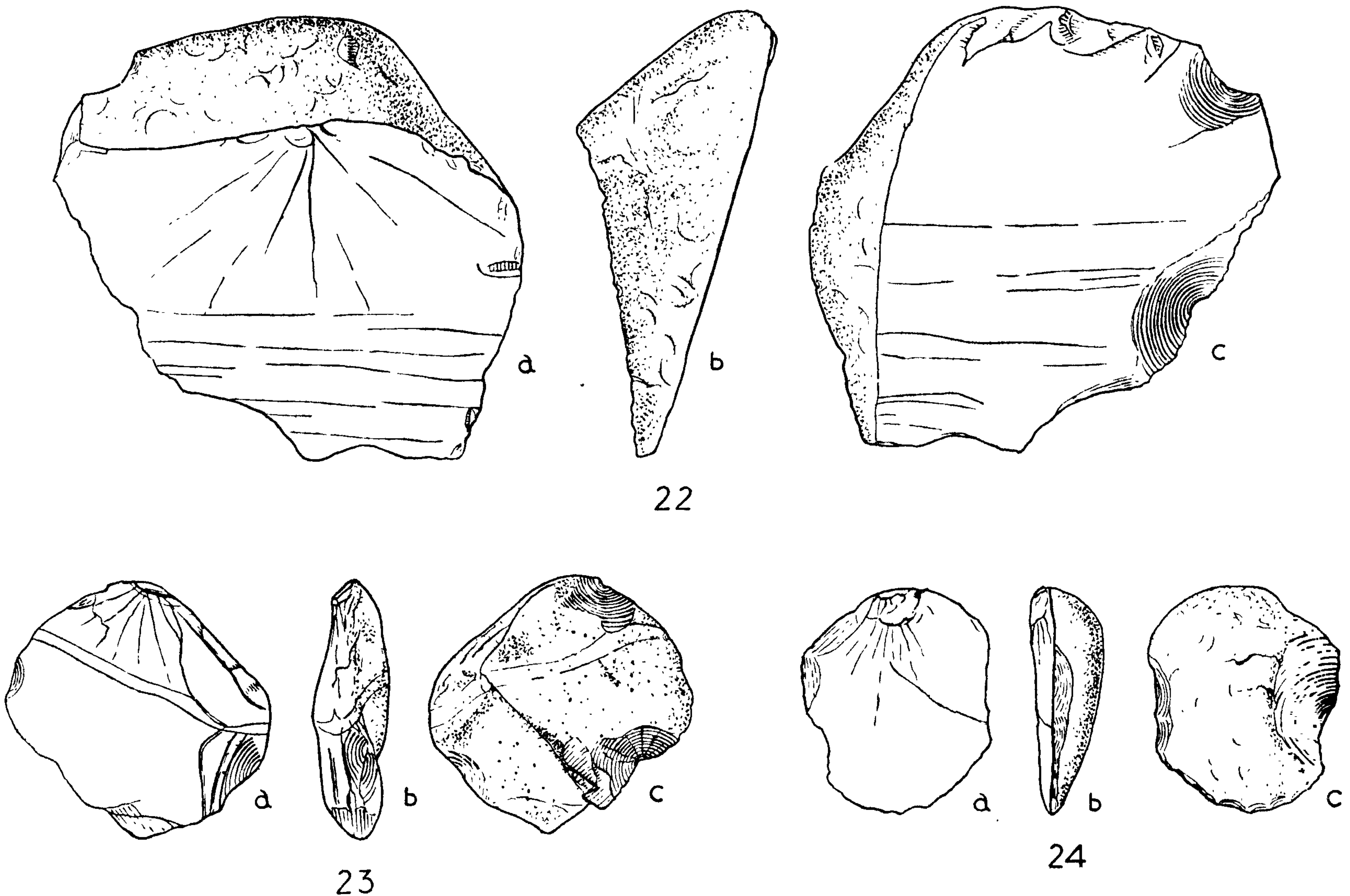


FIG. 11. *Guler: Clactonian flakes; 22, type F i, Terrace 1, 23, type F i, Terrace 2, 24, type F ii, Terrace 2*

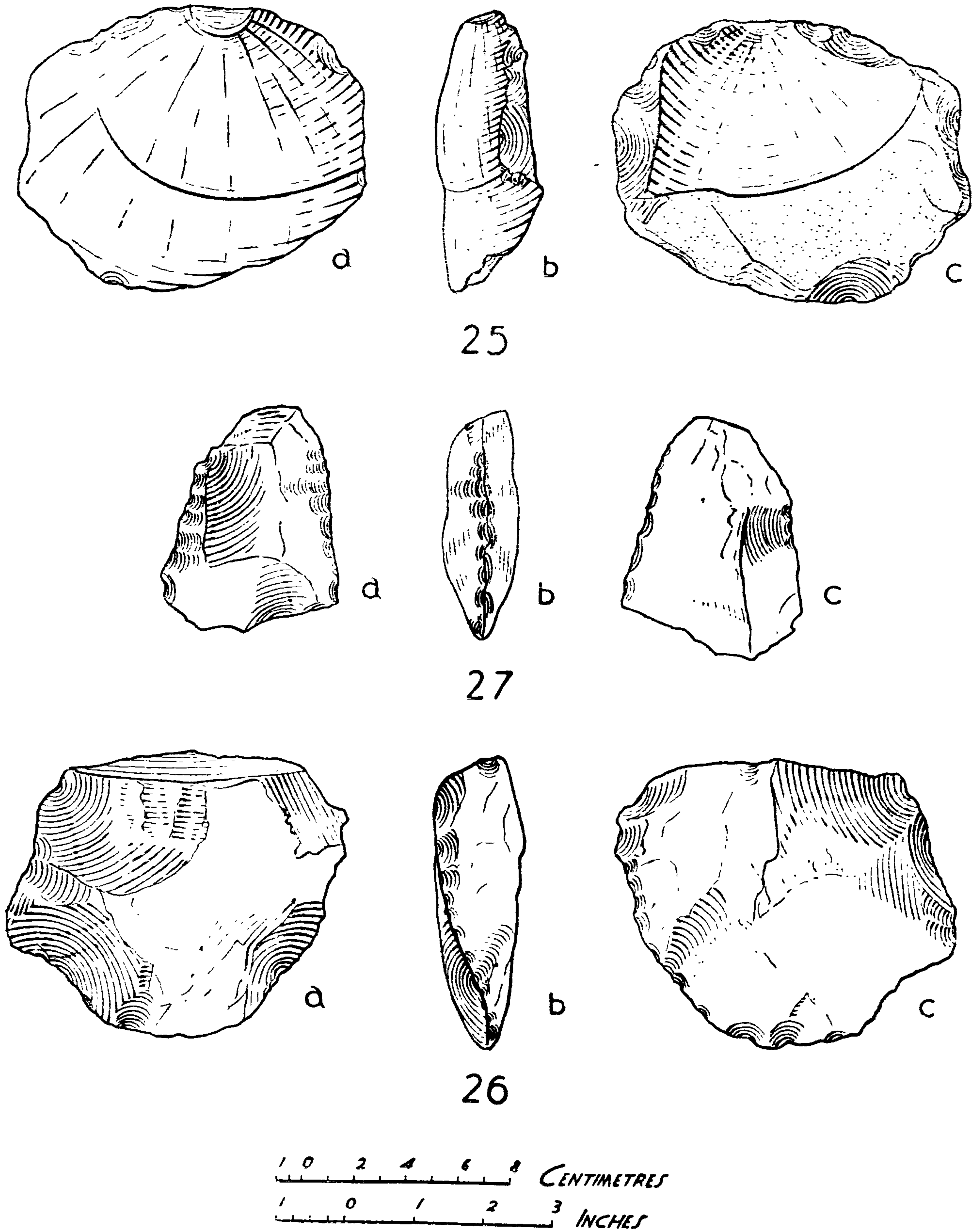


Fig. 12. *Guler: proto-Levalloisean flakes; 25 and 26, type F iii, Terrace 2, 27, type F iv, Terrace 2 or 3*

and the remaining four are Clactonian flakes with or without retouch. The other types of Guler are not represented in the collection. No true handaxe, nor even a 'pebble handaxe', was recovered. But in view of the limited extent of the exploration not much stress need be laid on the point.

Of the ten choppers, five are illustrated.

1. Unifacial 'chopper' with a straight cutting-edge and angular butt: type A i. Both the ventral and dorsal surfaces are nearly flat. The scar on the ventral side is thermal.

2. Unifacial 'chopper' with a straight cutting-edge and sub-angular butt: type A i. The dorsal side is comparatively convex, with the result that the flaking is more steep in this case than in the former.

3. Unifacial 'chopper' with a roughly crescentic cutting-edge and sub-angular butt: type A ii. The ventral side is rounded and the dorsal comparatively flat.

4. Unifacial 'chopper' with a 'fan-shaped' cutting-edge and a curved side functioning as butt: type A iii. The ventral side is flat. The dorsal side seems to have been humpy, but it is extensively flaked, very little of the cortex being left. The edge shows marks of fine secondary retouch.

5. Unifacial 'chopper' with a 'fan-shaped' cutting-edge and a curved side functioning a butt: type A iii. Illustration 'c' shows a nice scalloped outline of the edge of the tool.

4. DHALIARA

A. The site

After crossing the Beas at Dehra and covering about 4 miles towards Hoshiarpur one comes to a small village called Dhaliara. The road for the most part runs along a *nullah* which drains the water from the higher levels on the southern side into the Beas. A casual examination of the gravel-beds in the vicinity of Dhaliara revealed them to be implementiferous, and one feels that a regular exploration of the area might bring to light many more palaeolithic sites.

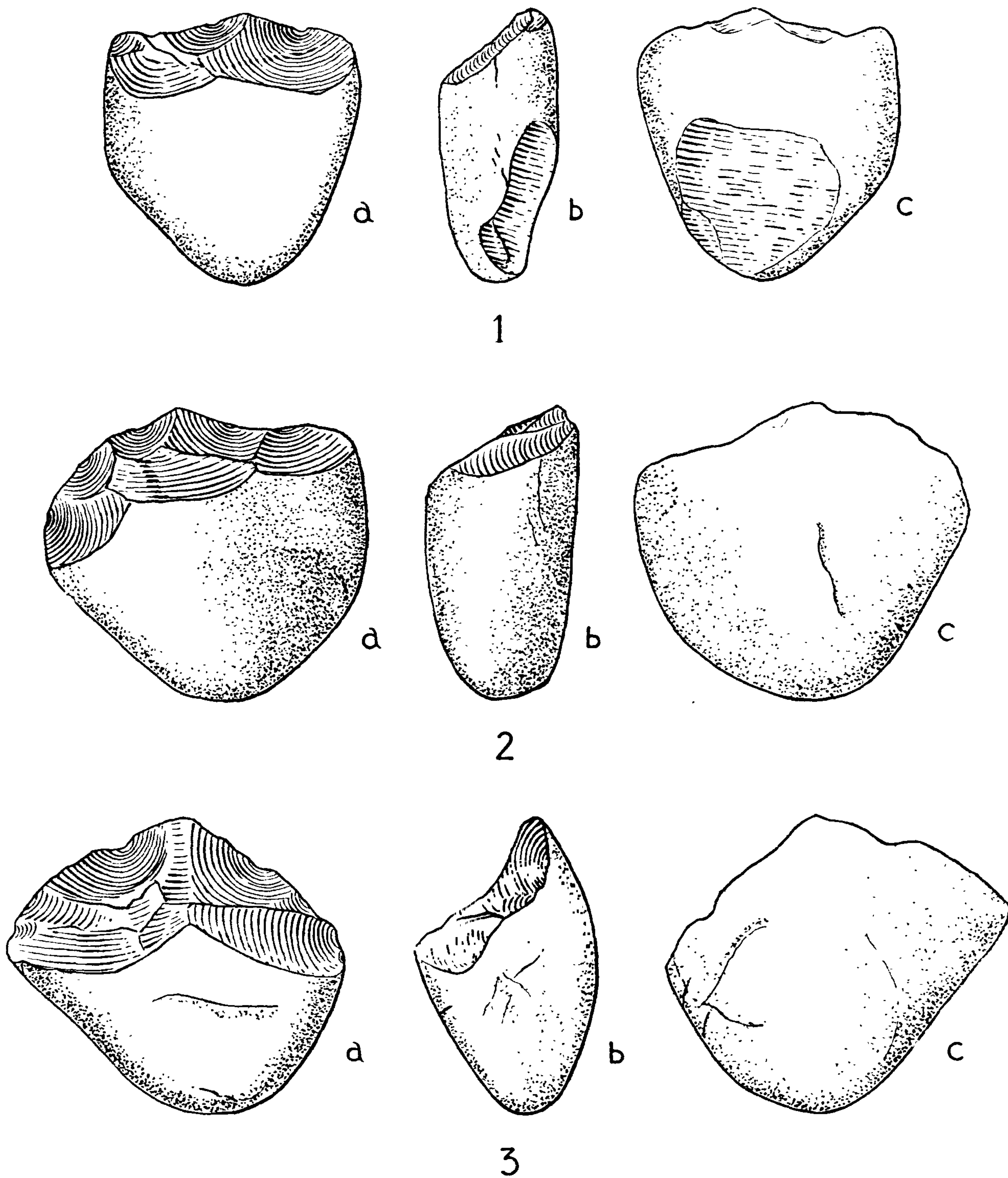
B. River-terraces

As Dhaliara stands at a higher level than Dehra, the terrace from which the implements were recovered at the former site was evidently older than the one on which the latter town is situated. However, in the absence of a proper survey of the area, it is difficult to say anything regarding the comparative positions of the implementiferous terraces at Dehra and Daliara.

C. The tools (fig. 15; pls. XXXIX and XL A)

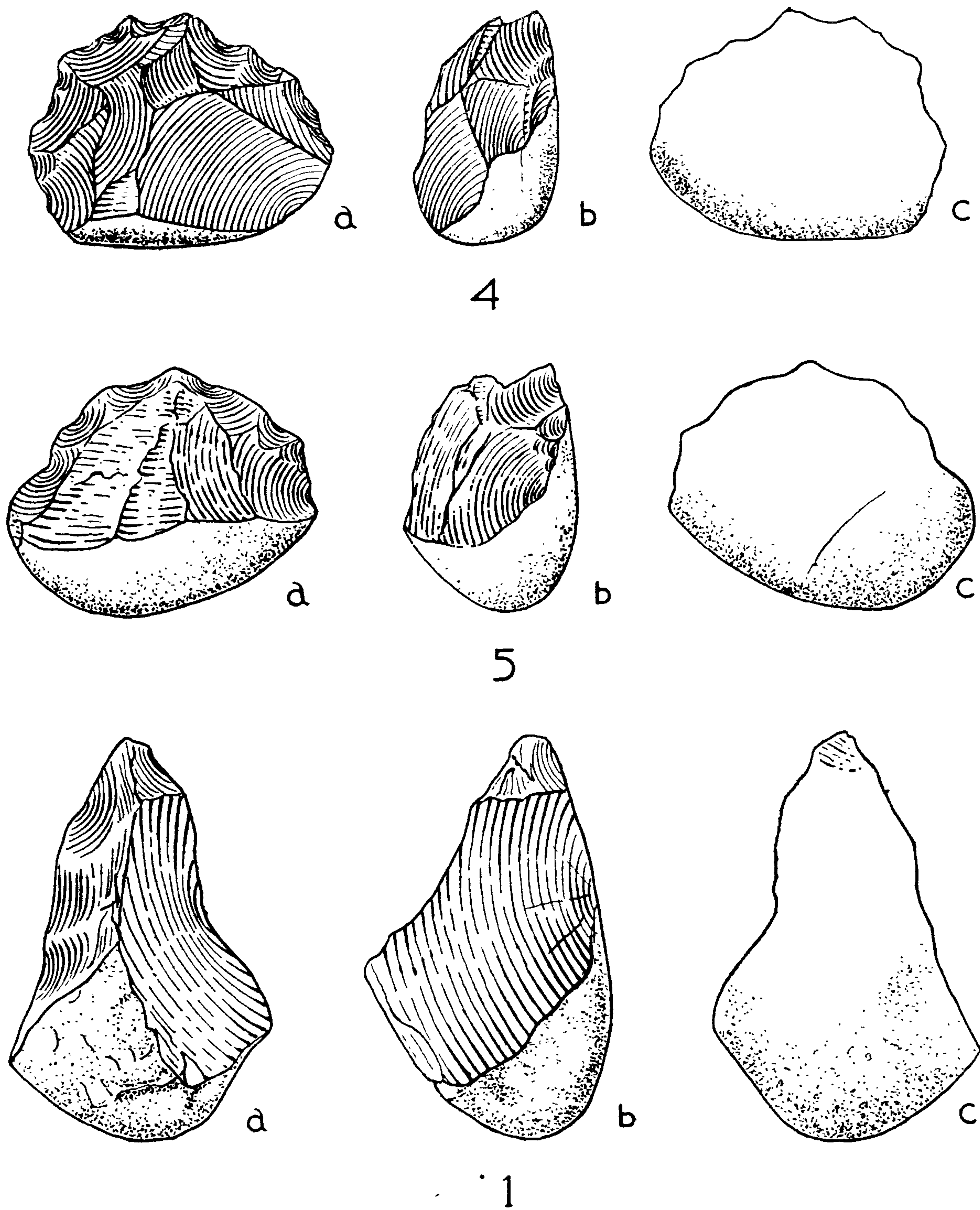
In the casual search only five palaeoliths were recovered. They include: four unifacial 'choppers', one of type A i and three of type A iii, and one 'pebble handaxe'. Of the five specimens, the following three are illustrated.

1. Unifacial ' chopper ' with a straight cutting-edge: type A i. The ventral surface is somewhat concave, while the dorsal one has a hump towards the middle. The edge has been obtained by taking out just a few flakes, there being hardly any secondary retouch·



1 0 2 4 6 8 CENTIMETRES
1 0 1 2 3 INCHES

FIG. 13. *Dehra: unifacial 'choppers'; 1 and 2, type A i, 3, type A ii*



1 0 2 4 6 8 CENTIMETRES
1 0 1 2 3 INCHES

FIG. 14. *4 and 5, Dehra: unifacial 'choppers', type A iii; 1, Kangra: 'pebble handaxe', type C*

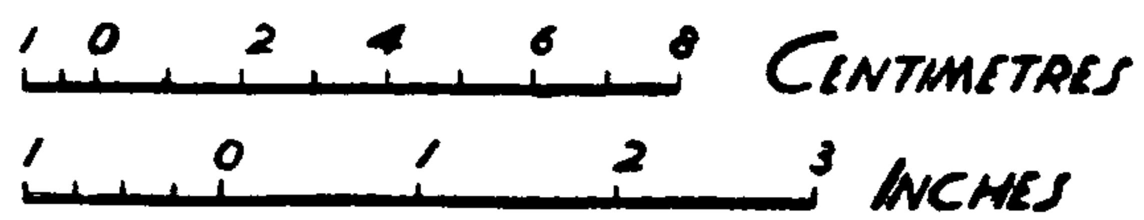


FIG. 15. *Dhaliara: 1 and 2, unifacial 'choppers', types A i and A iii respectively; 3, 'pebble handaxe', type C*

2. Unifacial 'chopper' with a 'fan-shaped' cutting-edge and a curved side functioning as butt: type A iii. The flaking is very steep, particularly towards the central part of the edge.

3. 'Pebble handaxe': type C. The specimen is somewhat patinated and rolled. As a result, the flake-scars are not very distinct, although the point is fairly prominent.

5. KANGRA

A. The site

Kangra (32°6′ N. Lat. and 76°16′ E. Long.) is one of the important towns in the District of the same name, the headquarters of the District, however, being Dharmasala, about 12 miles north-north-west of Kangra. It is connected both by rail and road with Pathankot, an important station on the Northern Railway. There is an inspection-bungalow at Kangra.

B. River-terraces

Two rivers, Patalganga (alternatively known as Manmuni) and Banganga, emanating from the southern slopes of the Himalayas, join each other at Kangra, and overlooking their confluence, on a high cliff of basal conglomerate, is situated a late medieval fort, now under the charge of the Department of Archaeology. The flat stretch of land in front of this fort represents a terrace, the actual height of which above the river-level, however, was not measured up owing to paucity of time. Other terraces, both lower and higher than this terrace were also observed within a mile from the fort-area, on the banks of the Patalganga and Banganga.

The bed-rock, as exposed in the river-sections, consists of layers of pebble-conglomerate interspersed with those of sand, the whole lot being slightly tilted. According to the recognized classification, these deposits are ascribable to the Tatrot zone of the Upper Siwaliks.

C. The tools

From a loose deposit on the bank of the Banganga, within half-a-mile from the fort, was picked up a stray palaeolith. Its presence indicates that somewhere in the neighbourhood might exist a site with much more material, but nothing definite can be said until further exploration of the area has been carried out.

The specimen (fig. 14, *1*; pl. XL B) may be classed as a 'pebble handaxe' of type C. The ventral surface is flat, but the dorsal one has a central hump. Flakes have been taken out of the dorsal surface from two opposite sides so as to produce a pointed end with a ridge running from the end to the central hump. There is very little of secondary retouch.

6. GENERAL DISCUSSION

The palaeolithic industry described in the preceding pages is characterized by the predominance of 'choppers' and 'chopping-tools'. The cores and flakes also form part and

parcel of the same complex. Statistically, out of the total of seventytwo specimens from Guler, Dehra, Dhaliara and Kangra, only two are handaxes,[1] affiliated to the 'Madras' industry. These comparative figures raise some vital questions. Do the 'chopper-chopping-tools' on the one hand and the bifacial handaxes and cleavers on the other represent two basically different traditions? If they do, does it mean that their manufacturers were altogether different peoples representing different racial groups? Or, do the 'chopper-chopping-tools' represent an early stage of a culture in which the hand-axes and cleavers are later developments? In the present state of our knowledge it is difficult to give categorical answers to these questions. All the same, an attempt may be made to assess the situation as far as possible (cf. fig. 16).

To begin with the Guler region itself, the two handaxes, as stated above (p. 70), may have belonged to either Terrace 2 or 3. Surely, they did not belong to Terrace 1. This shows that they appeared at Guler at a later stage. Did they then evolve from any of the types found in Terrace 1 or 2? Or, were they brought to the site by some fresh people? In the former case, the type that can be taken into account is what has been termed here as 'pebble handaxe', although the true handaxe is a bifacial tool worked all over, while the 'pebble handaxe' is unifacial with only a part of the dorsal surface flaked. The common points between the two types, however, are their elongated shape and pointed end.

In the Sirsa valley near Nalagarh and in the Sohan valley near Daulatpur, all the tools recovered belong to the chopper-chopping-tool series and none to the Madras biface-industry. The only tool from Nalagarh which may be taken to resemble the handaxe[2] is, in fact, a unifacial tool coming more correctly under the 'pebble handaxe' category. A specimen of 'pebble handaxe' has also been obtained from the Sohan basin,[3] but there is no true handaxe there.

The foregoing examples thus demonstrate that in some areas at a certain stage, and in some other areas throughout, the chopper-chopping-tool complex existed exclusively by itself, there being no element of the Madras bifaces. Further, even when the (doubtful) bifacial handaxes made their appearance in some of these areas, other associated types, particularly the cleaver, were still absent. And if further exploration of the Guler region does not bring forth indisputable handaxes, the two rolled and thermal-fractured specimens (above, p. 70) may also have to be written off. In that case the implication would be that the Nalagarh-Daulatpur-Dehra-Guler belt represents a stage when the chopper-chopping-tool industry had not come in touch with the Madras bifaces. However, for the present it would be too much to draw any inferences from data which have yet to be collected.

The Potwar region in Pakistan (cf. fig. 16) has a somewhat different story to tell. Here, on the Indus, the Boulder Conglomerate, ascribable to the Second Glaciation, has yielded only large-sized flakes, but neither the chopper-chopping-tools nor bifacial handaxes. Both these industries occur simultaneously in the next stage, Terrace 1, assignable to the Great Interglacial.[4] This would mean that either both the industries are part and parcel of one and the same culture or they may have originated elsewhere independently and may have reached the region after commingling. Further, while most

[1] As stated on p. 70, the specimens bear thermal scars and are also rolled. One would, therefore, like to have a few indisputable specimens before the occurrence of the true handaxe at Guler is finally established.

[2] Sen, *op. cit.*, pp. 182-83 and fig. 4.

[3] *Indian Archaeology 1954-55—A Review*, p. 58 and pl. LXII.

[4] De Terra and Paterson, *op. cit.*, pp. 303-04.

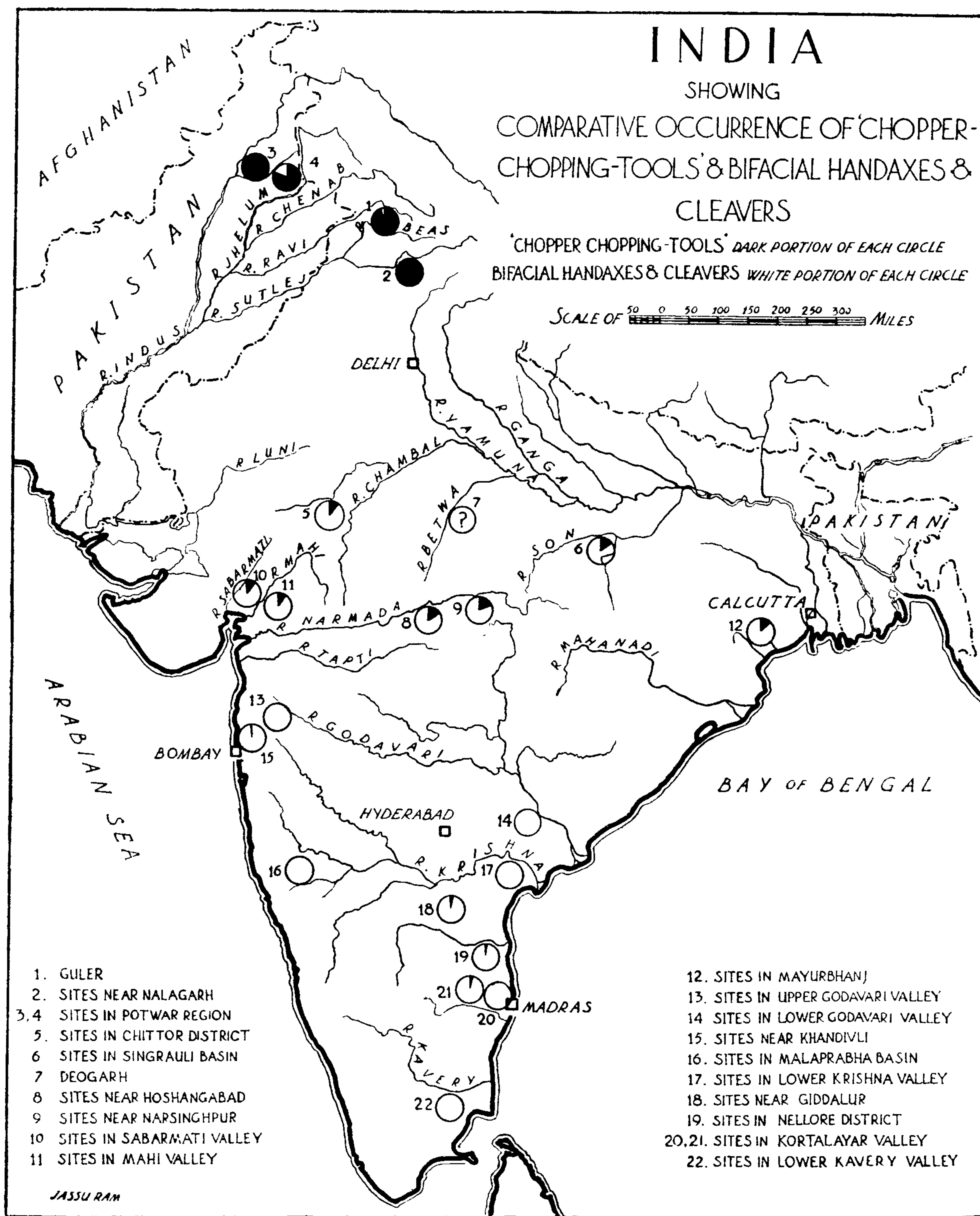


FIG. 16. [As it is intended just to give an idea of the comparative occurrence of the two industries in the broader regions of the country, only the more representative sites have been plotted. Further, the relative percentage has necessarily to be only approximate as full statistics are not available regarding many sites.]

of the sites in the Indus valley show preponderance of chopper-chopping-tools, at Chauntra, on the Sohan, the outstanding industry was the bifacial one, although it is ascribed to a somewhat later stage.

As one moves southwards, one finds a gradual decrease in the percentage of the chopper-chopping-tools and a corresponding increase in the number of handaxes and cleavers (cf. fig. 16). In the Chittor region of Rajasthan nearly nine-tenths of the tools belong to the latter series.[1] The Singrauli basin in Mirzapur District, Uttar Pradesh, has yielded only about 15 per cent chopper-chopping-tools, the rest being ascribable to the Madras industry.[2] In the central Indian plateau, the Narmada valley near Hoshangabad and Narsinghpur has yielded a fair number of chopper-chopping-tools and, although complete statistics are not available, the published information[3] indicates that roughly 15 to 20 per cent of the tools may belong to the chopper-chopping-tool complex. To the east, the Mayurbhanj region in Orissa has been found to contain chopper-chopping-tools only to the extent of about 10 per cent of the total number of palaeoliths discovered both in excavation and surface-exploration.[4] To the west, in the Mahi[5] and Sabarmati[6] valleys, the choppers account for about 8 to 10 per cent of the implements.

This decrease in the quantity of chopper-chopping-tools becomes more pronounced as one moves south of the Narmada-Tapti valleys. From the upper Godavari, near Nasik, Sankalia does not report any chopper-chopping-tool.[7] The same is the case with the Khandivli region near Bombay, explored by Todd, unless the few 'choppers' from the top of the lower clay are assigned to this complex.[8] Further south, the basin of the Malaprabha (a tributary of the Krishna) in Belgaum, Bijapur and Dharwar Districts of Bombay has been found to lack chopper-chopping-tools.[9] The lower basin of the Krishna explored by Cammiade and commented upon by Burkitt[10] has a more or less similar story to tell, although a recent exploration of the Giddalur region has brought forth a few specimens belonging to the chopper-chopping-tool complex.[11]

In Nellore District of Andhra pebble-choppers have been reported to represent about 2 per cent of the implements.[12] The palaeolithic industry around Madras, as represented at Vadumadurai, Attirampakkam and sites in the Red Hills, consists essentially of handaxes,

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[1] Information from Shri M. N. Deshpande and Shri S. R. Rao. Cf. *Indian Archaeology, op. cit.*, p. 58.

[2] Krishnaswami and Soundara Rajan, *op. cit.*, p. 47.

[3] De Terra and Paterson, *op. cit.*, pp. 321 ff.

[4] Bose and Sen, *Excavations in Mayurbhanj* (Calcutta, 1948), pp. 67 ff. and 118 ff. Mainly 'choppers' and 'side-choppers', made on pebble, i.e. types AI, BIa and BIb, come up for consideration here. To them may be added flakes and cores that may have gone alongside.

[5] Subbarao, *op. cit.*, p. 47.

[6] H. D. Sankalia, *Investigations into Prehistoric Archaeology of Gujarat* (Baroda, 1946), pp. 103-04. Cf. also F. E. Zeuner, *Stone Age and Pleistocene Chronology in Gujarat*, Deccan College Monograph Series, no. 6 (Poona, 1950).

[7] H. D. Sankalia, *The Godavari Palaeolithic Industry*, Deccan College Monograph Series, no. 10 (Poona, 1952).

[8] K. R. U. Todd, 'Palaeolithic industries of Bombay', *Jour. Roy. Anthropological Inst. Great Britain and Ireland*, LXIX, pt. II (1939), pp. 257 ff.

[9] H. D. Sankalia, B. Subbarao and R. V. Joshi, 'Studies in the prehistory of Karnatak', *Bulletin Deccan College Inst.*, XI, no. 1 (1950), pp. 56 ff.

[10] L. A. Cammiade and M. C. Burkitt, 'Fresh light on the Stone Ages of south-east India', *Antiquity*, IV (1930), pp. 327 ff.

[11] Soundara Rajan, *op. cit.*

[12] A. Aiyappan and F. P. Manley, *The Manley Collection of Stone Age Tools*, Mem. Arch. Surv. Ind., no. 68 (1942).

cleavers, discoidal or oval cores and flakes.[1] Chopper-chopping-tools are practically absent, unless the pebble-tools at Vadumadurai or some of the cores and flakes at Attirampakkam, thought to 'exhibit Sohan technique', are placed under this category.

The foregoing survey of the palaeolithic industries of the more important regions in India[2] reveals that while the chopper-chopping-tools represent the entirety of the collections at some of the sites in the sub-Himalayan region (e.g. Nalagarh, Daulatpur, Dehra, etc.), they are completely absent from quite a few sites in south India (e.g. Khyad, Gangawadi, etc.). In an overall picture, their overwhelming predominance in the north and corresponding scarcity in the south are amply clear. In the central region, along the Balia Nadi (Mirzapur), Sabarmati, Mahi, Narmada and Burhabalang (Mayurbhanj) axis, these tools account for from 10 to 20 per cent of the total number. It appears, therefore, that this industry had its primary focus in the north and dispersed *via* central India to the south, where, in certain regions, it practically petered out. The Madras industry, consisting of bifacial handaxes and cleavers, has almost the reverse tale. With its primary focus around Madras and neighbouring regions it decreases as one moves northwards, to the extent that in the sub-Himalayan region it is completely absent (as far as we know today) from some of the sites, e.g. Nalagarh, Dehra, etc. One thus gets the impression that the two industries may be basically different, having separate origins and meeting each other at a later stage. But there are some cross-questions which must be answered satisfactorily before this impression can be treated as a fact.

If the two industries are basically different, how is it that pebble-tools occur along with handaxes in the boulder-conglomerate, which is the earliest tool-bearing deposit, at Vadamadurai? In answer, can it be said with Krishnaswami that the few pebble tools and the bifaces 'may be related elements of the same tradition', the northern pebble tools being 'of a totally different tradition'[3]? Pebbles are available in most river-beds, and it is not unlikely that at places far apart tools may have been manufactured from them under different traditions. But before such a position can be accepted in respect of the pebble tools of the north and the south, one has to substantiate this with concrete examples—a work which yet remains to be done but which must be attempted as early as possible.

The next obvious question is: if the chopper-chopping-tools on the one hand and handaxes and cleavers on the other belong to two fundamentally different cultures, how do they both occur simultaneously in the Potwar region? In the first place, it must be stated that except for 'one or two rolled specimens of primitive form',[4] no definite example of the cleaver has been found in the Potwar region. Thus, one has to account mainly for the presence of handaxes, regarding which one may quote Paterson himself: 'So far these two entirely different cultures have been found in contact at one site only, Chauntra, where handaxes of the late Acheulian type are associated with cores and flakes of late Soan Age. The specimens from this site are, unfortunately, too few for the results of this contact to be determined'.[5] As the handaxes at Chauntra appear in a late context,

[1] De Terra and Paterson, *op. cit.*, pp. 327 ff. V. D. Krishnaswami, 'Changes of prehistoric man near Madras', *Jour. Madras Geogr. Assocn.*, XIII (1938), pp. 58 ff.; 'Prehistoric Man round Madras', *Ind. Acad. Sciences*, Madras meeting (1938); 'Stone Age India', *Ancient India*, no. 3 (1947), pp. 32 ff.

[2] As the intention was just to give a general idea of the occurrence of 'chopper-chopping-tools' in the broader regions of the country, it has not been considered necessary to include all the known palaeolithic sites in this short survey.

[3] V. D. Krishnaswami, 'Progress in prehistory', *Ancient India*, no. 9 (1953), p. 62.

[4] De Terra and Paterson, *op. cit.*, p. 308.

[5] *Ibid.*, p. 312.

they may either represent an infiltration from outside or an evolution from an earlier type, viz. the 'pebble handaxe'. However, owing to insufficient data nothing positive can be said on the point.

Outside India, the Anyathinian culture of Burma,[1] the Choukoutienian culture of China,[2] the Tampanian culture of Malaya[3] and the Patjitanian culture of Java[4] are wholly or largely dominated by chopper-chopping-tools, there being, however, some handaxes in the last-named culture. In Africa and Europe, on the other hand, the Lower Palaeolithic cultures comprise mainly handaxes and cleavers, although pebble tools do occur in the pre-Stellenbosch, early Oldowan and Kafuan stages in south and east Africa.[5] This distribution tends to suggest that even on a world-wide basis the chopper-chopping-tools on the one hand and handaxes and cleavers on the other represent two different cultures. However, to establish such a proposition fully one has to answer the very same questions as were posed in the preceding paragraphs while the Indian evidence was being interpreted: to reiterate, one must explain the occurrence of (i) handaxes in the Patjitanian culture of Java and (ii) pebble tools in the early Oldowan, Kafuan, etc., cultures of Africa. In respect of the former, it has been suggested that 'in the Far East implements of the handaxe type evolved independently'.[6] As to the latter, it has been argued that 'primitive tools of the chopper variety had a wide distribution at an early stage in the Old World' and they 'comprise a sort of sub-stratum',[7] the implication perhaps being that no great significance should be attached to the point.

There seems to be some force in these explanations, although one would hesitate to take them as final until the question has been examined more thoroughly. Typologically, most of the Patjitanian handaxes, with their pebble butt, flaking from two opposite directions and medial ridge,[8] are not very far removed from the 'pebble handaxe', such as found at Guler and Kangra (figs. 8, *15*, 9, *16* and 14, *1*; pls. XXX and XL B),

[1] T. O. Morris, 'The prehistoric stone implements of Burma', *Jour. Burma Res. Soc.*, XXV (Rangoon, 1935), pp. 1 ff.; H. L. Movius (Jr.), 'The Stone Age of Burma', *Trans. Amer. Philos. Soc.*, N. S., XXXII, pt. 3 (Philadelphia, 1943), pp. 341 ff.

[2] Davidson Black, Teilhand de Chardin, C. C. Young and W. C. Pei, 'Fossil Man in China', *Mem. Geol. Surv. China*, Series A, no. 11 (Peiping, 1933), pp. 1 ff.; Davidson Black, 'On the discovery, morphology and environment of Sinanthropus Pekinensis', *Philos. Trans. Roy. Soc. London*, 223 (1934), pp. 57 ff.; W. C. Pei, 'An attempted correlation of Quaternary geology, palaeontology, and prehistory in Europe and China', *Occasional Papers of the Institute of Archaeology of the University of London*, no. 2, Geochronological Table no. 1 (London, 1939), pp. 3 ff.

[3] H. D. Collings, 'Pleistocene site in the Malay Peninsula', *Nature*, CXLII (1938), pp. 575 f.

[4] G. H. R. von Koenigswald, 'Early palaeolithic stone implements from Java', *Bull. Raffles Museum*, Series B, no. 1 (Singapore, 1936), pp. 52 ff.; 'A review of the stratigraphy of Java and its relation to Early Man', *Early Man* (Philadelphia, 1937), pp. 23 ff.; H. De Terra, 'Pleistocene Geology and Early Man in Java', *Trans. Amer. Philos. Soc.*, N. S., XXXII, pt. 3 (1943), pp. 437 ff.

[5] H. Breuil, 'Archaic chipped pebble and flake industries from the Older Gravels of various sections of the Vaal valley', *South African Jour. Science*, 40 (1943), pp. 282 ff.; M. C. Burkitt, *South Africa's Past in Stone and Paint* (Cambridge, 1928); *The Old Stone Age* (Cambridge, 1949); H. B. S. Cooke, 'A preliminary survey of the Quaternary period in southern Africa', *Archl. Ser.*, no. iv (Bureau of Archaeology, Union of South Africa, 1941); L. S. B. Leakey, *Stone Age Africa* (Oxford, 1936); *Olduvai Gorge* (Cambridge, 1951); C. van Reit Lowe, P. G. Sohnge and D. J. L. Visser, 'The geology and archaeology of the Vaal river basin', *Mem. Geol. Surv. Union of South Africa*, Dept. of Mines, no. 35 (Pretoria, 1937); T. P. O'Brien, *The Prehistory of Uganda Protectorate* (Cambridge, 1939).

[6] Movius, *op. cit.* (1944), p. 113.

[7] *Ibid.*, p. 104.

[8] *Ibid.*, fig. 37, *4* and 38, *3* and *4*.

the basic conception in both cases being almost the same. As regards the occurrence of pebble-choppers in Africa, Leaky has observed: 'It is, therefore, essential to stress that the evidence at Olduvai Gorge does not support the conclusion that the Oldowan culture persisted as an *independent* culture during the time the Chelles-Acheul culture was developing'.[1] This clearly shows that the pebble tools did not have the same kind of evolutionary story in Africa as they had in south-east Asia. In the former area they ceased to exist beyond the 'sub-stratum' stage, while in the latter the story began and continued with them. Thus, in their full-blooded stages, the two cultures do seem to stand apart. And here it may be worthwhile to stress that the cleaver, which is a very outstanding type of the handaxe-cleaver culture at its maturity,[2] is conspicuous by its absence in the chopper-chopping-tool cultures of south-east Asia. This point further spotlights the distinct characters of the two cultures. But the question still remains: did the two cultures have independent origins, each representing a distinct racial type? Or, did they shoot off from the same stem at a very early stage and then develop independently ? Since palaeoliths are the earliest of human artefacts (as known today), one has to accept that, if the former proposition is correct, Man emerged from the ape-stage independently in two different areas.[3] In the latter case, the development of tool-types on two entirely different lines may perhaps be explained by the environmental necessity of the areas concerned, but then one has to imagine the diffusion of mankind from one centre to all over the world as early as the pre-Stellenbosch stage. Thus, indeed more evidence and much more intensive study of the material already at our disposal are necessary before the final word can be said in the matter.

7. POSSIBILITIES OF FUTURE WORK IN THE REGION

The work done so far at Guler and its neighbourhood cannot be said to be more than a mere beginning. Much waits ahead and must be carried out before a clear-cut picture of the palaeolithic industry of the area as well as of its chronological horizon can be obtained.

In the first place, the various terraces on either side of the Beas near Dehra must be duly identified and specimens of tools collected from them separately. Then the Beas terraces should be correlated with those of the Banganga at Guler, which again should be correlated with those at Kangra. For this, several intermediary places will have to be examined, as the distance between Kangra and Guler, along the river-bank, is nearly 14 miles. But what is more important is a correlation of the terraces at Kangra with those further upstream. The Banganga has its source in the glaciated Himalayas which are hardly 25 miles away. Thus, with a systematic survey of the terraces of the Banganga from Kangra to the glaciated region, one can surely work out the sequence of the terraces at Kangra in terms of Glacial and Interglacial epochs of the Pleistocene. Carrying the evidence further, the terraces at Guler and Dehra can also be assigned to their respective chronological horizons, and consequently the tools from these terraces can be securely dated.

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[1] Leakey, *op. cit.*, pp. 36 f.

[2] The cleaver seems to have made its appearance a little later than the handaxe. Cf. Leaky, *op. cit.*, p. 95.

[3] The fossil-remains of early man, e.g. the Pithecanthropus (including Sinanthropus), Neanderthal and Homo sapiens groups do not doubt show a wide difference. Cf. B. B. Lal, 'Prehistoric lithic industries of Indian Sub-continent', *Jour. World History*, I, no. 3 (Paris, 1954), pp. 514-15.

Further exploration of the region is likely to bring to light many more palaeolithic sites. While carrying out the exploration one must keep an extra-vigilant eye on the occurrence or absence of handaxes and cleavers. Lastly, one may cherish the hope of getting remains of the Palaeolithic Man, as the area is quite suitable for the formation of fossils.

ROCK-CUT CAVES IN COCHIN[1]

By Y. D. SHARMA

CONTENTS

1. INTRODUCTION

AS early as 1819 J. Babington communicated a paper to the Literary Society of Bombay, giving the details of two rock-cut caves discovered by him at Bangla Motta Paramba in Chirakkal Taluk of north Malabar.[2] Since then, down to the present day, the discovery, in most cases accidental, of a large number of similar caves in various parts of Malabar has been reported by many scholars. Even Sewell's *Lists*,[3] which, although an excellent pioneer-work, was compiled about seventy years ago on incomplete and not always reliable data, enumerates nearly one hundred and sixty such caves in Malabar alone. In point of fact, the number of these remarkable caves is much larger than can be made out from the earlier notices. On the basis of their number alone, they were worth at least some attention much earlier; unfortunately, however, no

[1] Revised from a paper read at the Thirtyfourth Indian Science Congress, Anthropology and Archaeology Section, Delhi, 1947.

[2] J. Babington, 'Prehistoric antiquities', *Trans. Lit. Soc. Bombay*, 1819.

[3] R. Sewell, *Lists of Antiquarian Remains in the Presidency of Madras*, I (Madras, 1882), pp. 240 ff. The author himself has warned in his preface that the information given in his book should not be considered conclusive or necessarily accurate. A case in point is that of the Kakkad cave, mentioned *ibid.*, p. 254, which, according to him, is 'a rock-cut cave with pillars', whereas, in fact, it is a cave with a top-opening.

systematic exploration or comprehensive study of them, geographically, architecturally or culturally, has yet been attempted on an appreciable scale.

Geographically, the rock-cut caves were supposed by G. Jouveau-Dubreuil to be confined to Malabar District alone.[1] Subsequently, however, it has come to light that they have a much wider distribution. Of the three broad physiographic divisions of Kerala—the alluvial sea-board, the plains with extensive lateritic outcrops and the uplands composed of granitic gneiss and charnockite[2]—the lateritic region of Cochin contains a good number of these caves (fig. 1) situated on high grounds, locally known as *parambas*.

On behalf of the Archaeological Survey of India, Shri V. D. Krishnaswami examined in 1946 some of the important caves cut into the numerous lateritic rocks in Talappalli, the northernmost Taluk of the former Cochin State. Later on, I was associated with him in his work, of which the present paper is the result. I am, therefore, highly indebted to him for placing his material at my disposal and for other assistance. I must also thank Shri Anujan Achan, then State Archaeologist in Cochin, who extended his ungrudging co-operation to the Archaeological Survey party.

Shri N. R. Banerjee has helped me with his suggestions and has checked up the drawings and descriptions of the caves on the spot. For the drawings I owe thanks to Shri Bhaskaran Nair and Shri Lakshmi Dutt and for the photographs to Shri V. M. Naicker and Shri M. B. Limaye.

2. GENERAL FEATURES OF THE CAVES

The excavators of these caves first sunk a pit into the rock, usually rectangular or nearly rectangular, to a depth varying in individual cases, by scooping out the solid mass of laterite. Into the vertical face of the rock was then cut a small rectangular entrance, either a little above the floor-level of the open quadrangle or flush with it. And through this narrow opening, which hardly permitted a man to crawl through on all fours, being on an average 1 ft. 6 in. both in width and height, was the hard laterite hollowed out and the cave fashioned.

Access to the floor of the outer court was gained by means of steps cut out of the rock by the authors of the caves themselves.[3] The floor of the interior of a cave is invariably 1 ft. to 2 ft. lower than the floor of its outer court. On the sides of a cave usually are rock-cut benches, varying in height from 6 in. to 2 ft. But they are a variable feature: some of the caves have a single bench, only on one side,[4] while others have none at all.[5]

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[1] G. Jouveau-Dubreuil, *Vedic Antiquities* (Pondicherry, 1922), p. 12.

[2] Cf. *Census of India*, 1941, XIX, Cochin (Ernakulam, 1944), p. 1.

[3] The Cochin Archaeological Department built parapet-walls around the open court of some of these caves to give them better protection and added to or renovated the original steps for the convenience of visitors (cf. pls. XLI A, XLIII A and XLIV B). These well-intentioned measures, however, to a certain extent conceal and disfigure the original character of the caves.

[4] E.g. Kattakampal caves, Panunda A, described by M. D. Raghavan, 'The rock-cut caves of Malabar', *Dr. Krishnaswami Aiyangar Commemoration Volume* (Madras, 1936), pp. 384-89, fig. 3(*1*), and the caves described by F. Fawcett, 'Rock-cut sepulchral chambers in Malabar', *Jour. Anthrop. Inst.*, XXV (1895-96), pp. 371-73.

[5] E.g. Porkalam-2, Bangla Motta Paramba caves, Feroke-2, and some of the Perungulam caves described by A. Rea in the *An. Rep. Supdt. Arch. Surv., Southern Circle, Madras,* 1910-11 (1911), p. 11. Feroke-1, as described by A. Aiyappan, 'Rock-cut cave tombs of Feroke, S. Malabar', *Quart. Jour. Mythic Soc.*, XXIII (1933), pp. 299-314, has a bench, but it is segmented from the wall of the cave, which is an unusual feature.

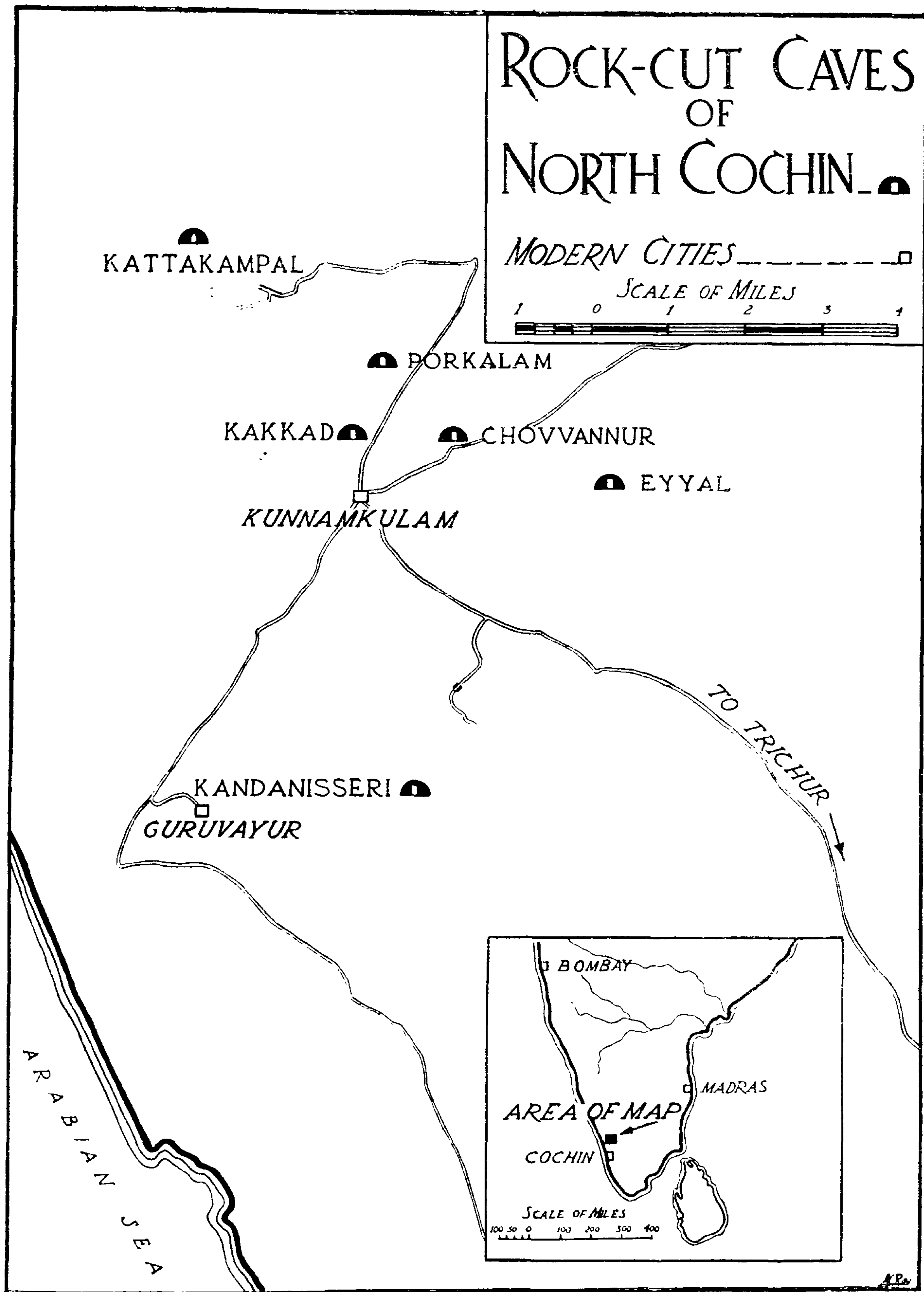
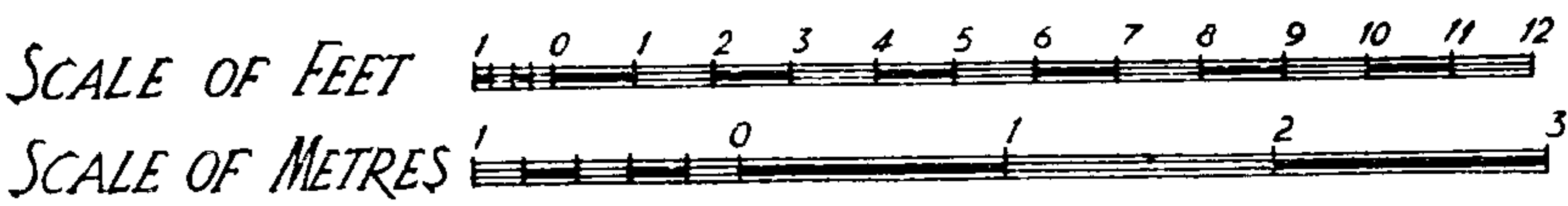
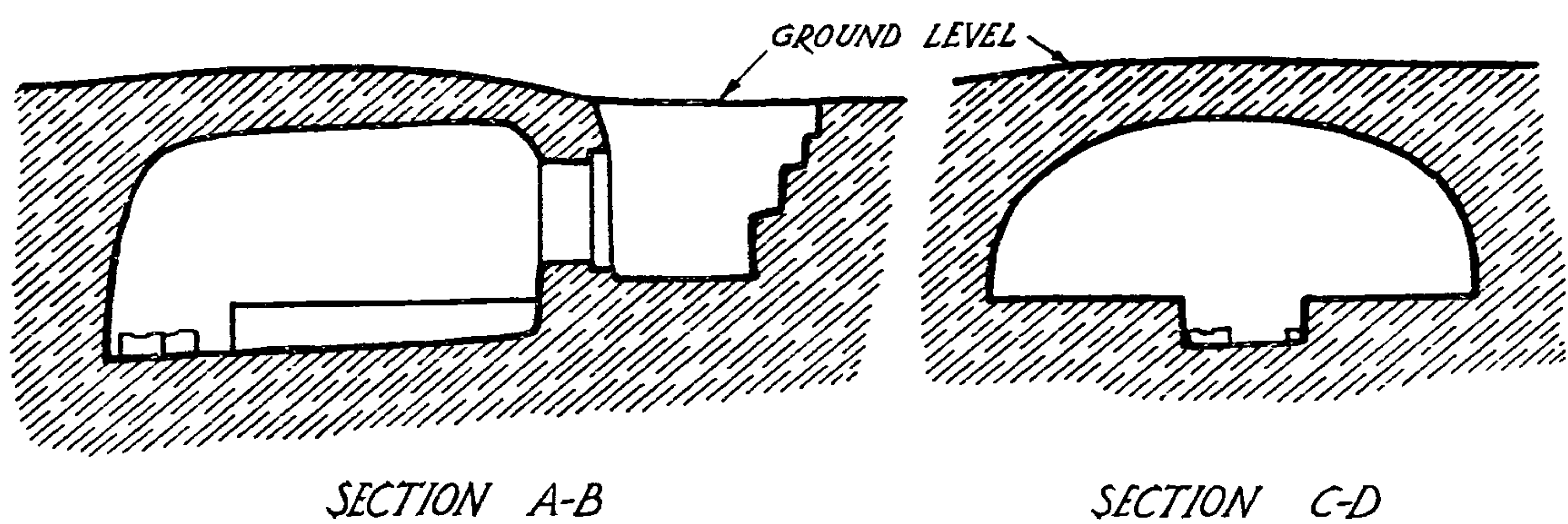

ROCK-CUT CAVES OF NORTH COCHIN
MODERN CITIES
SCALE OF MILES
1 0 1 2 3 4
KATTAKAMPAL
PORKALAM
KAKKAD
CHOVVANNUR
EYYAL
KUNNAMKULAM
TO TRICHUR
KANDANISSERI
GURUVAYUR
ARABIAN SEA
BOMBAY
MADRAS
AREA OF MAP
COCHIN
SCALE OF MILES
100 50 0 100 200 300 400

FIG. 1

CAVE AT CHOVVANNUR (COCHIN)





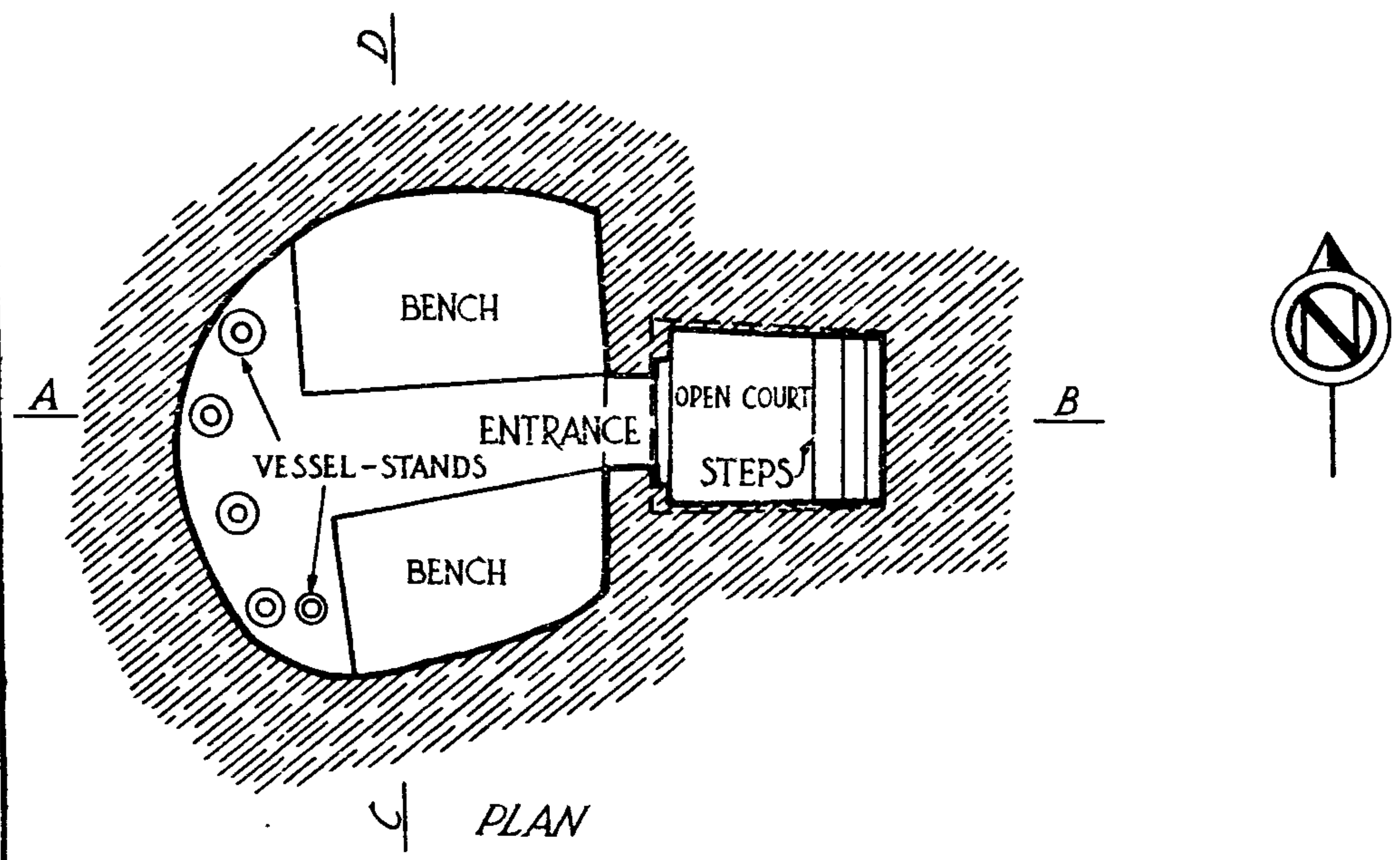
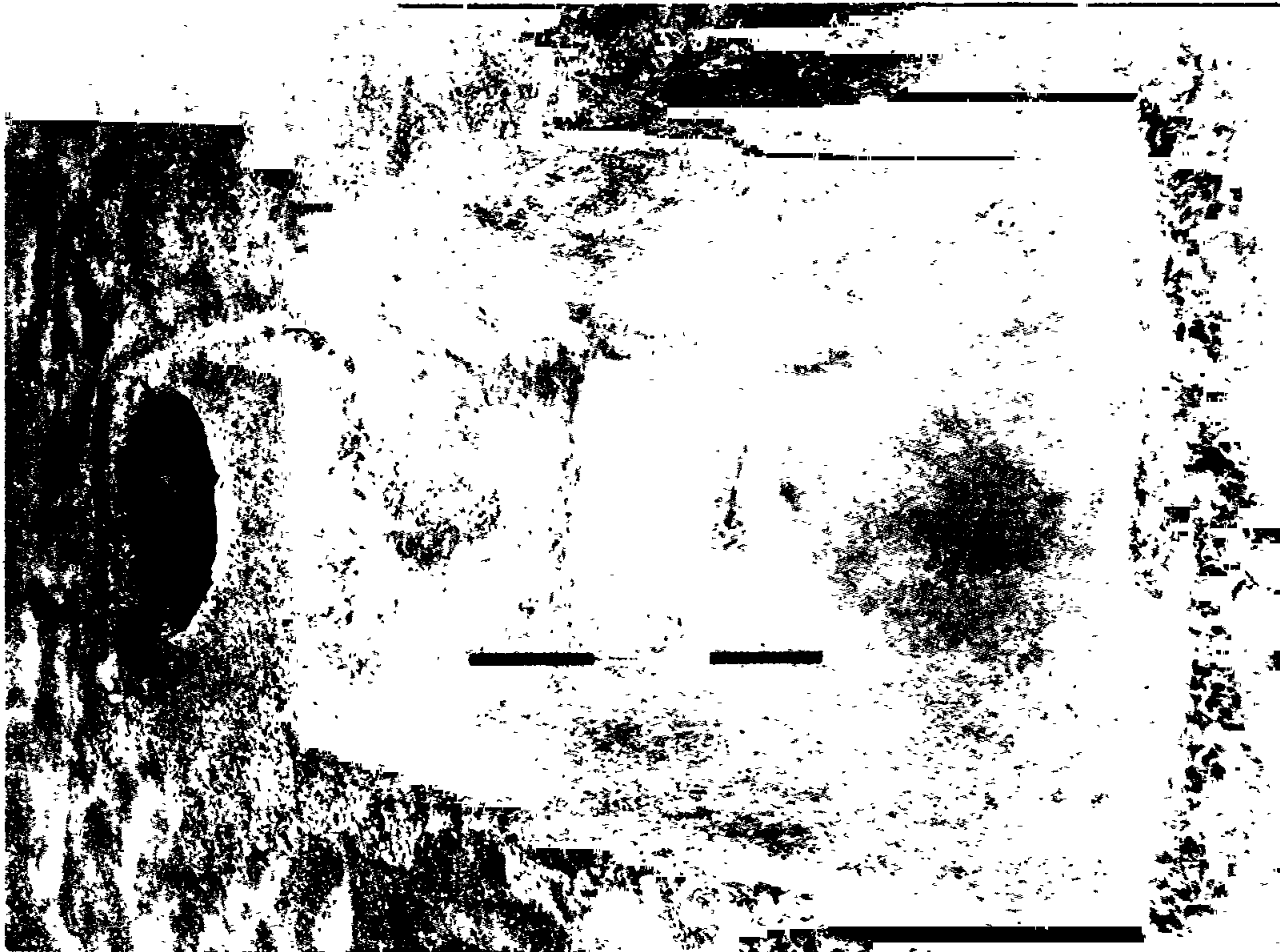
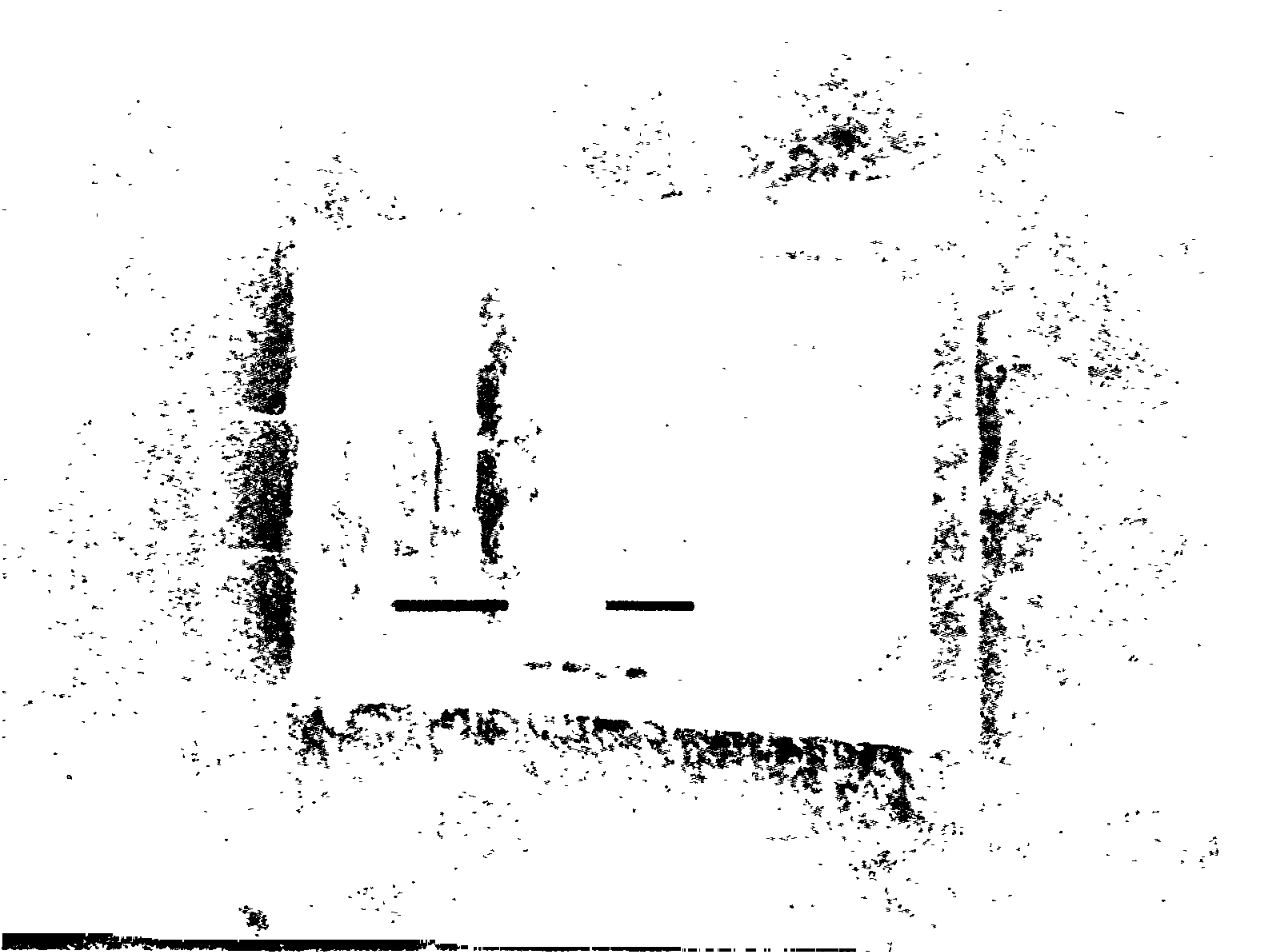


Fig. 2



B



A

Rock-cut caves at, A, Chovvannur, and B, Kandanisseri. *See page 97*

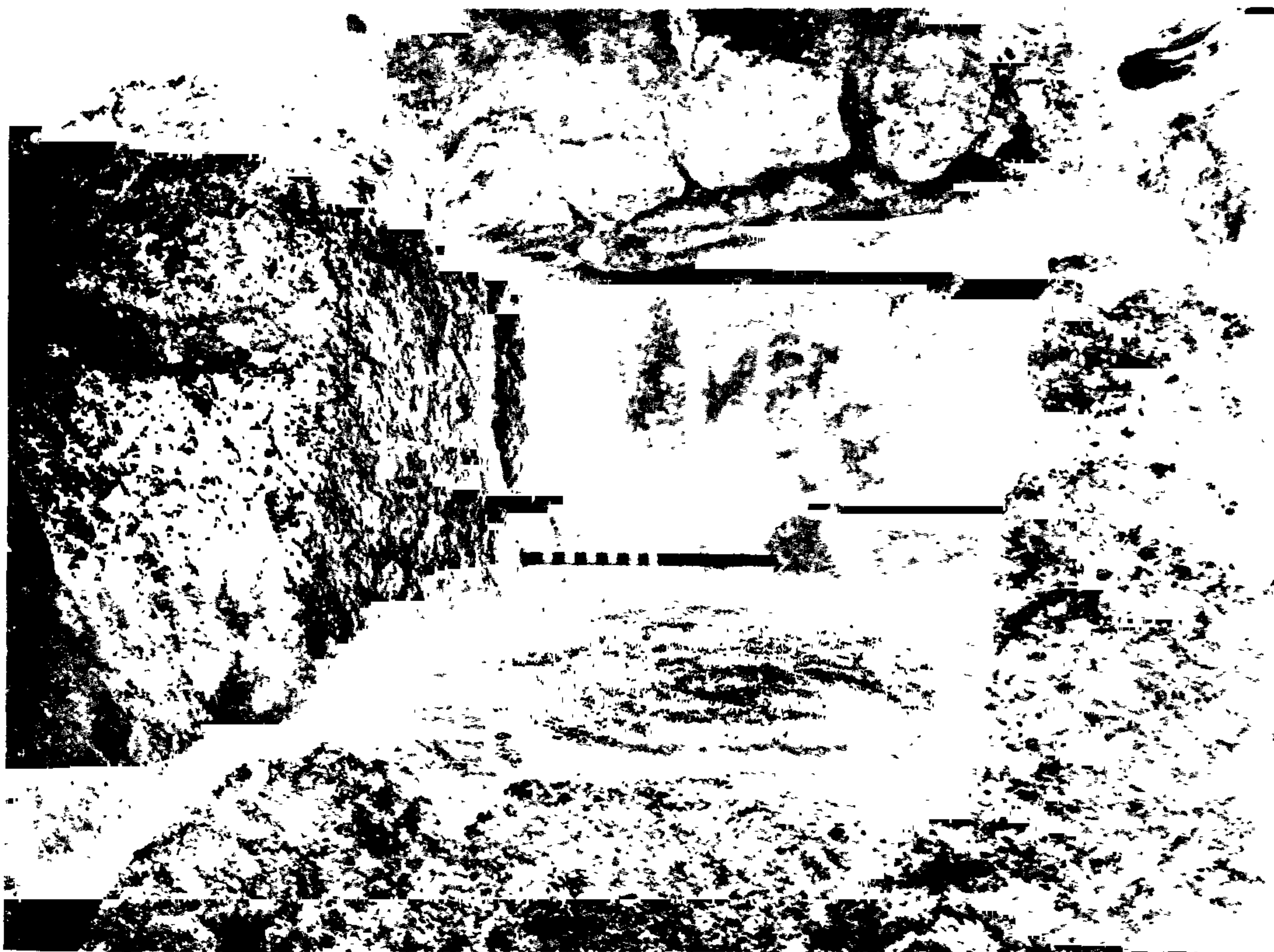
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Rock-cut cave at Kakkad. *See page 99*

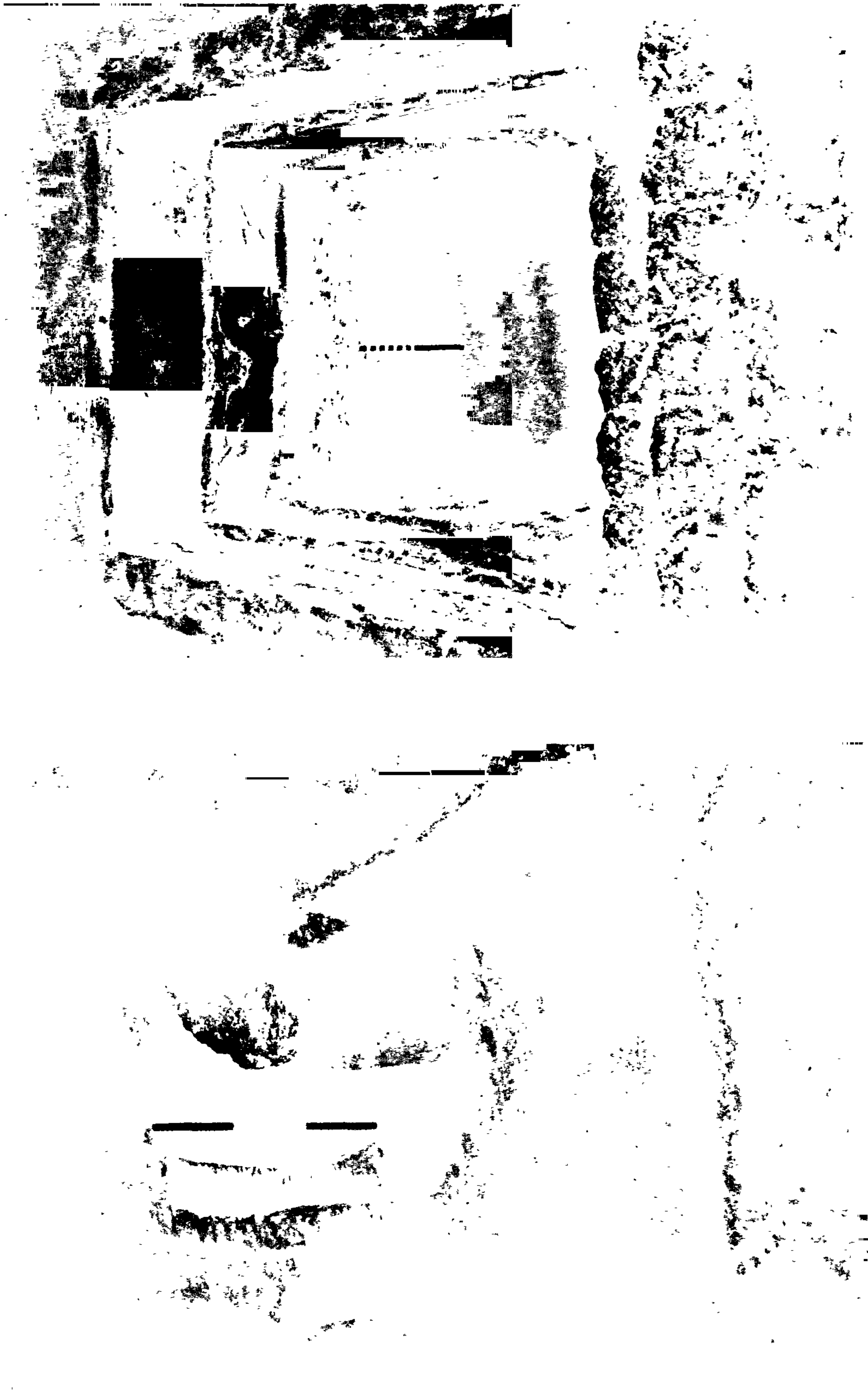


B



A

Rock-cut caves at Porkalam. *See page 101*



A B

Rock-cut caves at, A, Eyyal and, B, Kattakampal. *See page 101*

The floor of most of the caves is circular or oblong on plan, while their vault is dome-shaped, although caves with rectangular floors and flat ceilings are by no means unknown. There is in some caves a rock-cut pillar, square, rectangular or round, rising to the centre of the vault from the middle of the floor; in others, it is absent; while in yet another type there is a circular opening in the centre of the domed ceiling.

These, then, are the common characteristics of this type of monuments. I shall now proceed to a brief description of each of the caves examined in 1946.

3. DESCRIPTION OF THE CAVES

A. Chovvannur

The cave at Chovvannur (fig. 2; pl. XLI A) is situated on the northern side of the Kunnamkulam-Vadakkancheri road, about 2 miles north east of the town of Kunnamkulam.[1] It is entered through a recessed opening on the east, the entrance being 1 ft. 6 in. wide and 1 ft. 7½ in. high. The other sides of the interior of the cave are circular and its vault hemispherical. On its northern and southern sides are two benches, one 5 ft. 3 in. long and 3 ft. 2 in. broad, and the other 4 ft. 9 in. long and 2 ft. 8 in. wide at the broadest point, both about 8 in. high from the surface of the floor. Along the western side of the interior, there are five circular blocks cut out of the laterite, differing in height but in no case higher than the benches. The largest of these measures 9 in. and the smallest 6½ in. in diameter, the larger three and the smaller two placed in separate clusters. Judging from the depressions in the middle of their top-surface, they appear to be intended as stands for vessels. The cave has no central pillar nor any top-opening. The top of the ceiling is 3 ft. 7 in. high.

The inside surface of the cave is unusually smooth, testifying to the advanced workmanship of its builders.

B. Kandanisseri

The cave at Kandanisseri (fig. 3; pl. XLI B), which is situated half a mile south of Ariyannur in Ariyannur-desam, is also entered through a recessed opening, although the opening here is inclined towards east-south-east. The inner recess, 2 ft. 3 in. wide and 1 ft. 10 in. high, leads into a chamber with a hemispherical dome and a paraboloid floor, on all sides of which, excepting the entrance-side, are three benches, each with three legs cut out of the rock, the hollowed-out space between the legs taking the shape of the base of the benches; they are only 6 in. wide and do not extend under the whole width to the back of the benches. The benches, though not of uniform size, are roughly 5 ft. long, 3 ft. wide and 1 ft. high. The surface of each bench is bounded by a low ridge of 3 in. width on its outer edges.

[1] Some of the Cochin caves have been noticed by Anujan Achan in *An. Reps. Administration Arch. Dept. Cochin State*, but his descriptions need verification, since the particulars given by him are often inadequate and inaccurate. The present cave, for instance, is described in *ibid.*, 1102 M.E. (1926-27), p. 8, as a rectangular cave with a hearth for lighting fire—details which do not at all agree with the structure of the cave.

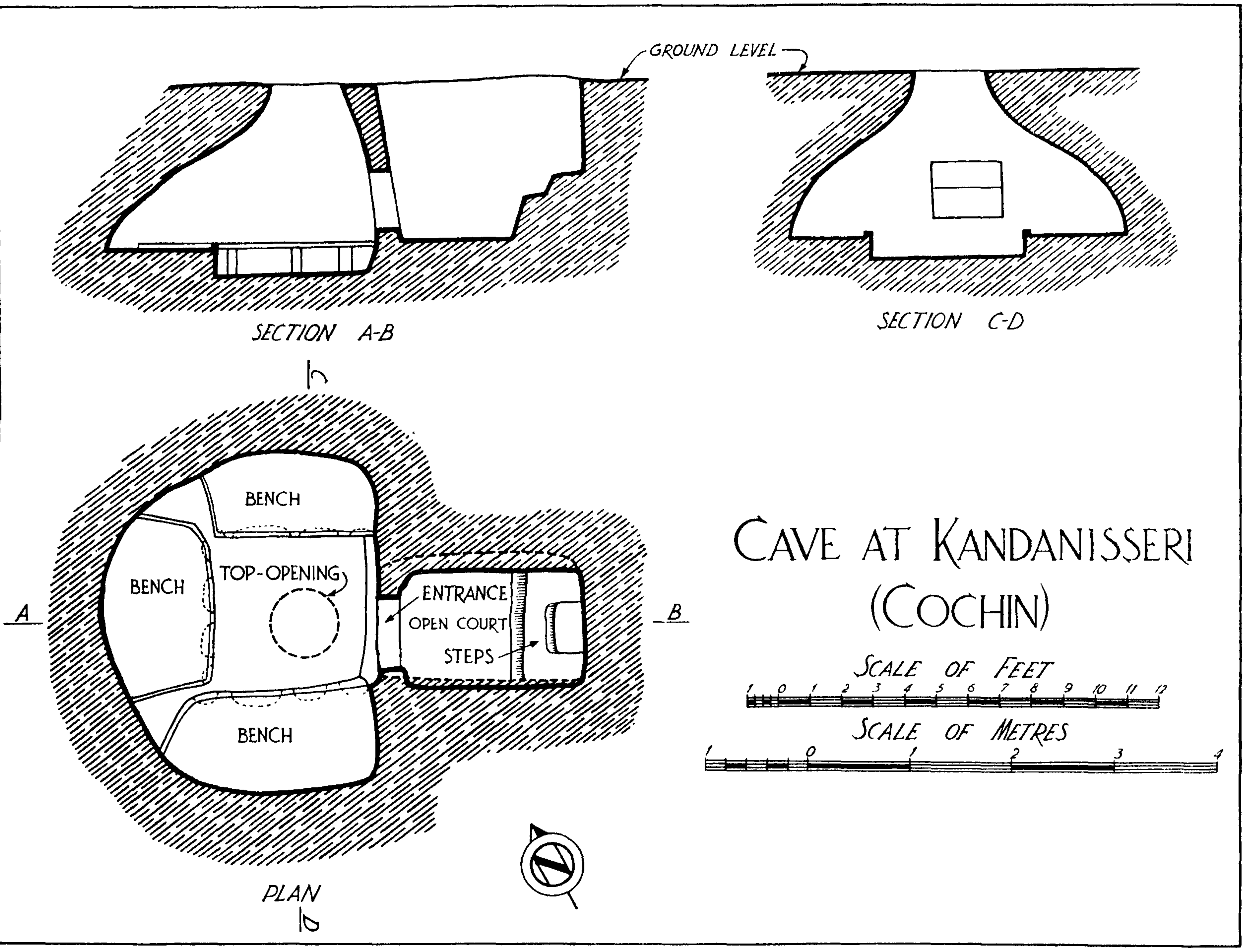

GROUND LEVEL
SECTION A-B
SECTION C-D
BENCH
BENCH
TOP-OPENING
ENTRANCE
OPEN COURT
STEPS
BENCH
A
B
C
D
PLAN
CAVE AT KANDANISSERI
(COCHIN)
SCALE OF FEET
1 0 1 2 3 4 5 6 7 8 9 10 11 12
SCALE OF METRES
1 0 1 2 3 4

FIG. 3

At the centre of the domed vault of the cave there is a circular opening, about 2 ft. 3 in. in diameter at the top communicating with the sky. The total height of the domed vault is not more than 5 ft. from the floor.

The whole cave—including its doorway, the surface of the benches, their legs and the niches between them—has been plastered with lime in recent times, thus concealing the original surface of its interior. This may have been done by the Satyavāsī saints, who are reported by the local people to have inhabited the cave within living memory.

Of all the caves examined by the party, the two described above are the only ones which possess recessed entrances. They correspond in this respect to the two caves at Bangla Motta Paramba,[1] the main chambers in the Padinyattamuri cave,[2] the Perungulam caves,[3] the Mennapuram cave,[4] the Panunda caves and possibly also the Chelleth cave.[5] But while the entrances to the Cochin caves contain only one recess, others have as many as three or four, looking sometimes rather like the jambs of a doorway—which indicates that they were built at a stage when the technique of cave-cutting had comparatively advanced. This scheme also facilitates the operations, as for each subsequent jamb the thickness to be cut is reduced.

C. Kakkad

The cave at Kakkad[6] (fig. 4; pl. XLII), situated on the slope of a hill 1 mile north of the town of Kunnamkulam, has a narrow entrance on the east, 1 ft. 9 in. wide and 1 ft. 7 in. high at the outer edge, and its top opening, 2 ft. 4 in. in diameter, places it in the same category as the Kandanisseri cave. Access to the entrance is by means of a flight of three steps cut into the lateritic sub-soil on its eastern side. Running along the circumference of its northern side there is only a single sectoral bench, 7 ft. 10 in. long, 2 ft. 9 in. at its widest point and 2 ft. 3 in. high, into the base of which two small niches have been hollowed out, the portions left uncut thus becoming the supports or legs of the bench. To the south of the bench, near the entrance, is a rock-cut circular block, 1 ft. 1 in. in diameter, closely resembling the vessel-stands of the Chovvannur cave (above, p. 97), and no doubt intended for the same purpose, in spite of the absence of any depression on the top.

The cave is dome-shaped and paraboloid on plan with an almost straight edge on the entrance-side. At the same height as the bench, it has a 2-in. deep dado-line, running all round its wall, except on the entrance and bench-sides. In addition, it has a 3-in. wide pilaster-like projection on either side of the interior of its entrance, curving inwards as it rises above and gradually merging with the wall-surface towards the top, so that, higher

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[1] Babington, *op. cit.* His illustrations have been reproduced by W. Logan in *Malabar*, I (Madras, 1906), illustrations III-VI.

[2] W. Logan, 'Find of ancient pottery in Malabar', *Indian Antiquary*, VIII (1879), pp. 309-11. The plans and sections of the Padinyattamuri cave have been reproduced by the same author in *Malabar*, illustration VII.

[3] Rea, *op. cit.*, pp. 10 ff.

[4] Jouveau-Dubreuil, *op. cit.*, pp. 13 ff. Dubreuil's illustrations are not altogether accurate and reliable. The court outside the Mennapuram cave is open on one side according to his plan, whereas, in fact, it is probably bounded on all the four sides. His illustrations of a cave at Bangla Motta Paramba, reproduced from Babington's paper, are also distorted.

[5] Raghavan, *op. cit.*

[6] Cf. Anujan Achan, *op. cit.*, 1102 M.E. (1926-27), p. 7; 1103 M.E. (1927-28), p. 4.

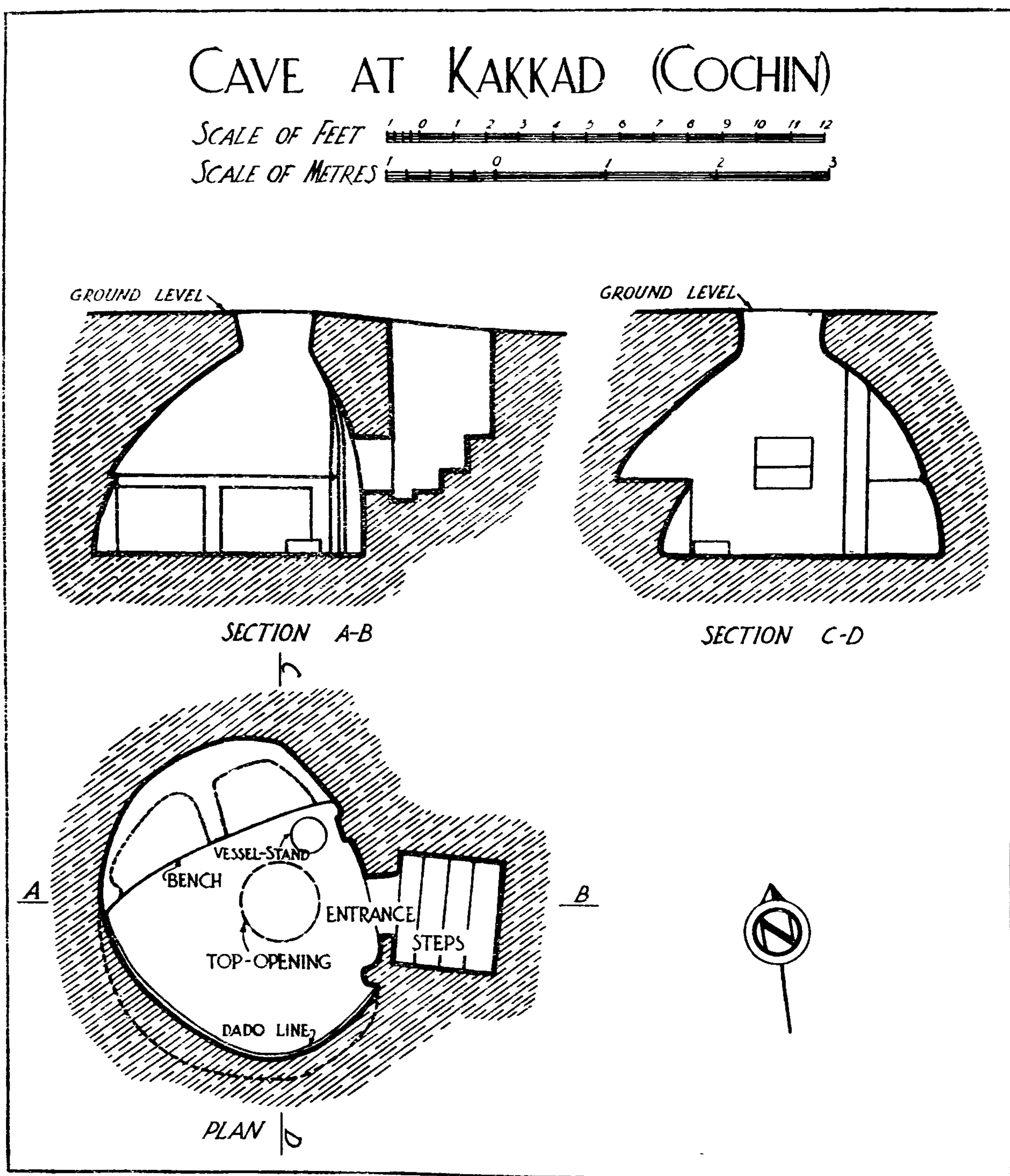

CAVE AT KAKKAD (COCHIN)
SCALE OF FEET
SCALE OF METRES
GROUND LEVEL
GROUND LEVEL
SECTION A-B
SECTION C-D
VESSEL-STAND
BENCH
ENTRANCE
STEPS
TOP-OPENING
DADO LINE
A
B
PLAN

FIG 4.

above, it vanishes altogether before reaching the vault. These features distinguish this cave as belonging to a later development in the technique of cave-cutting. The unusual height of the cave, 6 ft. from the floor, and the top-opening, which belongs, as will be seen below (p. 114), to the later stages in the development of cave-architecture and which, incidentally, connects this cave not only with the Kandanisseri cave (above, p. 98) but also with such other caves as at Bangla Motta Paramba and Feroke, also speak for a comparatively late age for this cave.

D. Porkalam

At Porkalam,[1] 2 miles north of Kunnamkulam, two caves were examined and surveyed. Both of them face west-north-west and are situated one behind the other, with a gap of 6 ft. 3 in. between them, Porkalam-2 lying to the north-west of Porkalam-1.

The entrance of Porkalam-1 (fig. 5; pl. XLIII A) is 1 ft. 4 in. wide and 1 ft. 6 in. high. Its top-cutting is not exactly horizontal; instead, it is slightly curved on either end, thus having the shape approximately of a horizontal arch. There are two benches inside the cave, one on each side of the entrance, the first of which is 5 ft. 6 in. long and 1 ft. 8 in. broad and the other 4 ft. 11 in. long and 2 ft. 9 in. broad, while their height, 6 in. in both, is unusually low for similar benches in other caves. Close by the side opposite the entrance are four vessel-stands, as in the Chovvannur cave (above, p. 97), their diameter varying between 6 in. and 8½ in. and their height corresponding to the height of the benches.

Porkalam-2 (fig. 6; pl. XLIII B) has no bench at all; nor has it a vessel-stand. But both the caves have a rock-cut central pillar. The rectangular base of the pillar in Porkalam-1 is considerably wider than the column proper, which, 10 in. by 10 in., rises from one end of the base, leaving a square flat seat by the side of the pillar. The pillar in Porkalam-2 has no adjoining seat and is about 1 ft. square. The low seat by the pillar in Porkalam-1, however, seems to recur in the caves of the Padinyattamuri group. Facing the entrance, as here, there appears on Logan's plan a stool or low seat by the side of each pillar (marked M on his plans).

The entrance of Porkalam-2, originally 1 ft. 6 in. wide and 1 ft. 8 in. high, but now unsymmetrically wide owing to the disintegration of the rock, is also horizontally arched. One foot above the entrance there is a pattern cut out in the rock looking vaguely like an ill-shaped *ḍamaru*, most likely a later interference.

A part of the roof and the side on the north-eastern corner in Porkalam-2 has collapsed, creating an opening there. The side-wall immediately below this opening had also at some time weakened or had otherwise sustained damage, since it has been reinforced with blocks of laterite and other building material.

The central pillars in both the Porkalam caves are narrowest in the middle, from where, both downwards and upwards, they gradually spread out, until at the top, which is 3 ft. 1 in. high in Porkalam-1 and 2 ft. 9 in. in Porkalam-2, they merge with the surface of the vault. A similar tendency of gradual broadening may also be observed in the pillar of the cave near Calicut.[2]

In the Porkalam caves neither are the vaults so hemispherical nor the floors so circular as in the caves described earlier. Porkalam-2 appears rather like a square with

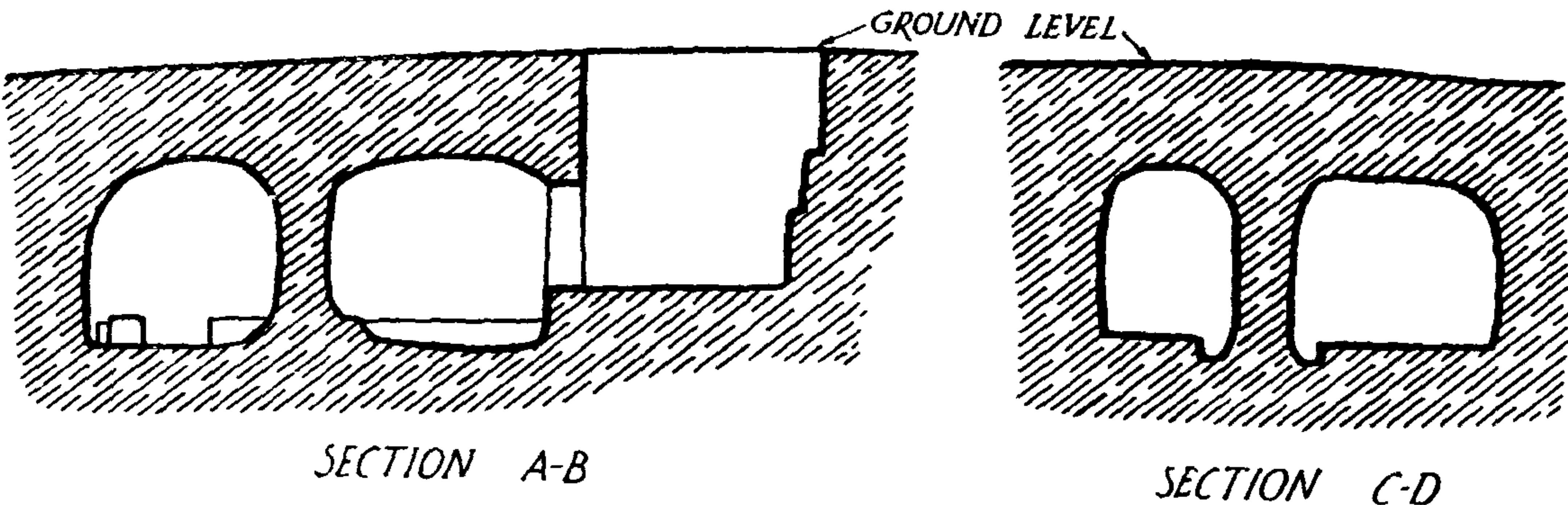
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[1] Cf. *An. Rep. Administration Arch. Dept. Cochin State*, 1103 M.E. (1927-28), p. 8.

[2] A. H. Longhurst in *An. Rep. Arch. Surv. Ind.*, 1911-12 (1915), pp. 159 f., and pl. LXXII.

CAVE AT PORKALAM-1 (COCHIN)





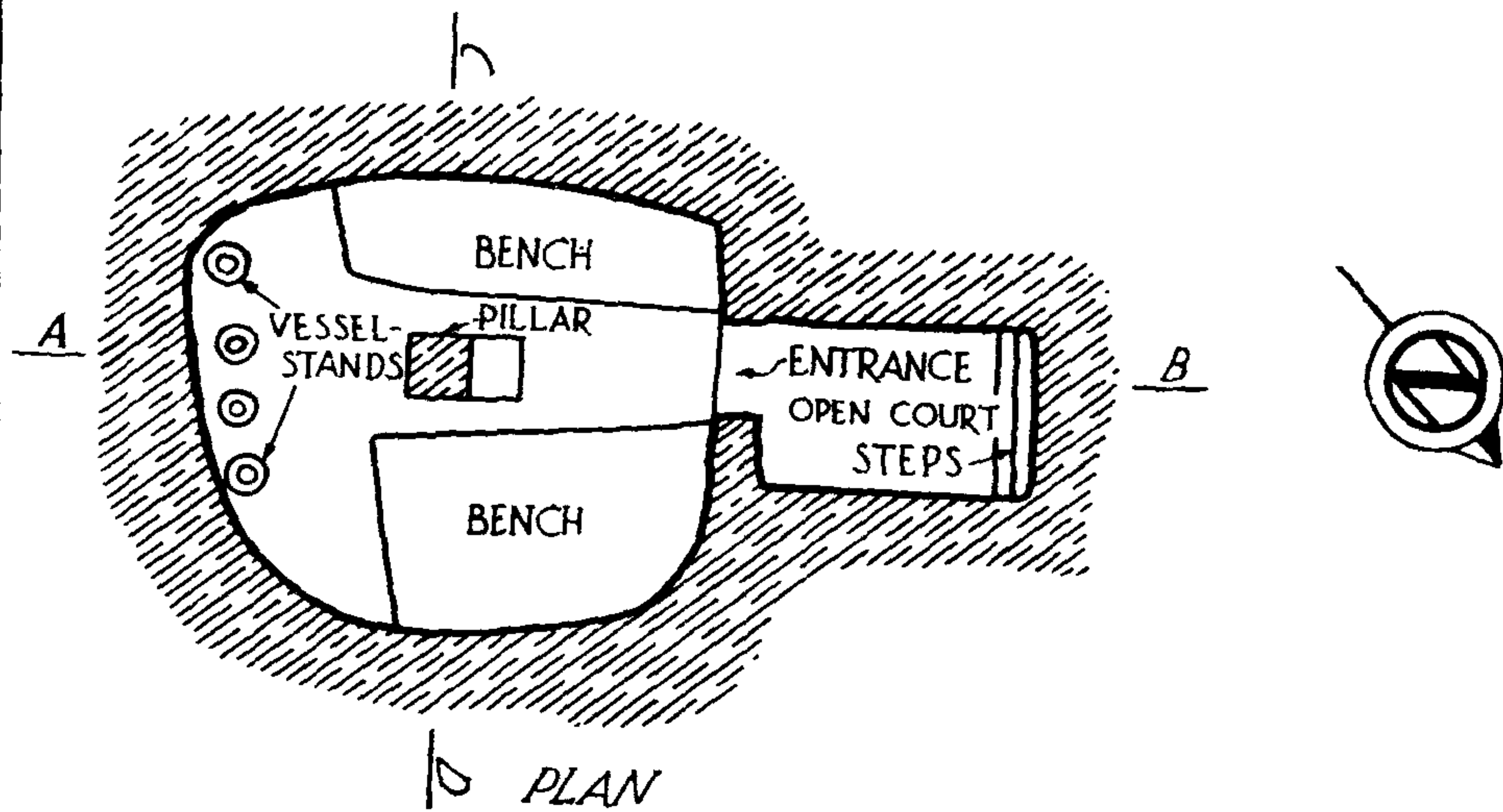


FIG. 5

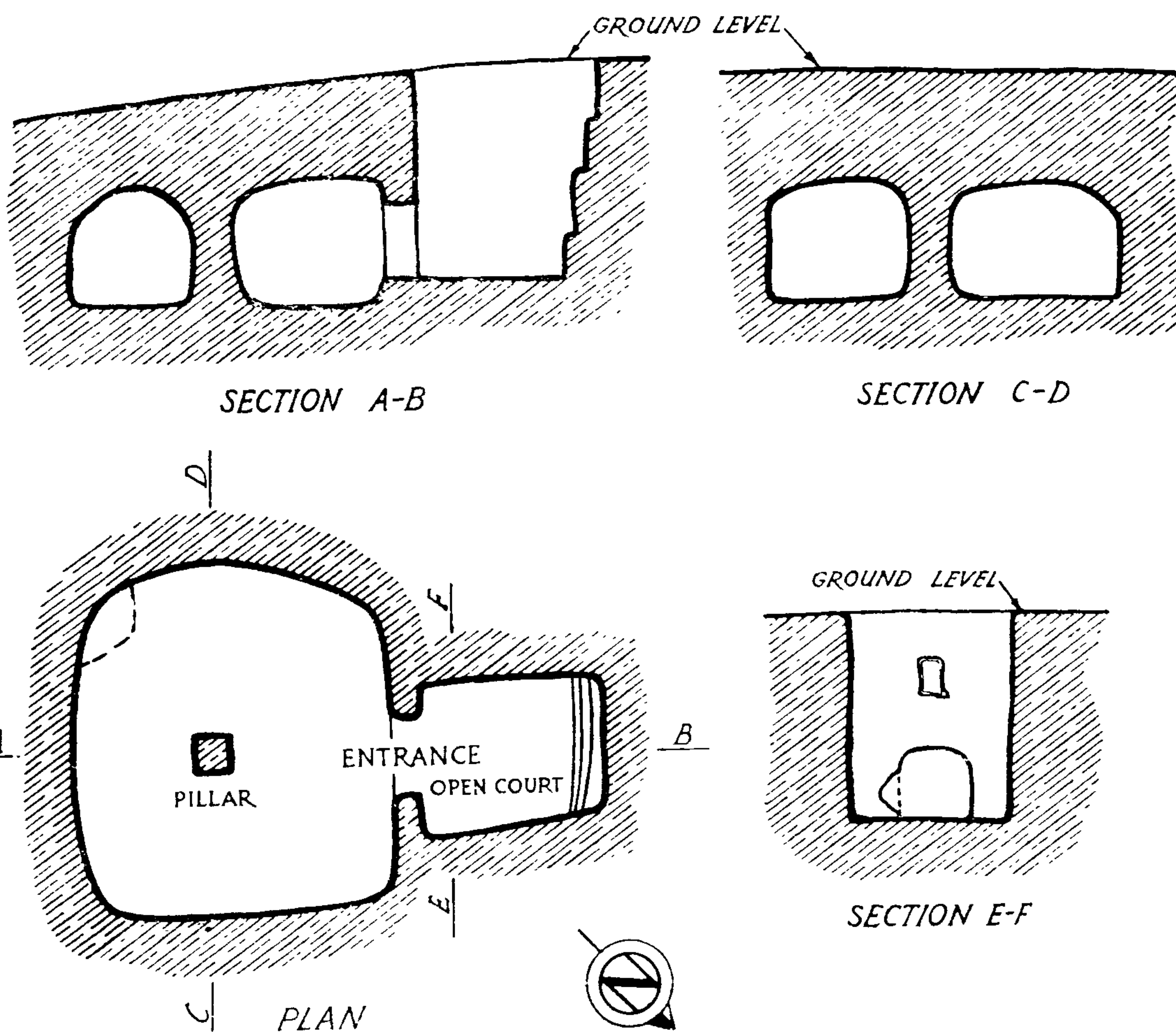

CAVE AT PORKALAM-2 (COCHIN)
SCALE OF FEET
SCALE OF METRES
GROUND LEVEL
SECTION A-B
SECTION C-D
GROUND LEVEL
SECTION E-F
PILLAR
ENTRANCE
OPEN COURT
PLAN

FIG. 6

rounded corners, while two sides of Porkalam-1 are roughly circular but the other two nearly straight. Apparently there has been considerable interference with Porkalam-1. Its north-eastern interior wall has the appearance of having been built in with laterite building material, since, while the other sides of the cave are comparatively smooth, the north-eastern side is unusually rough. Originally, therefore, the floor of Porkalam-1 was in all probability fairly circular. Also, as its entrance is now to one side of the existing court and not in the middle, as is usual with the Cochin caves, the original outer court must have been wider than it is at present and obviously extended further north-east.

E. Eyyal

At Eyyal, 2½ miles south of Cheramanangad on the Kunnamkulam-Vadakkancheri road, is situated a double-chambered cave (fig. 7; pl. XLIV A), the same outer court leading in front to the main chamber, X, with its roof now partly collapsed, and on the right hand side to a smaller chamber, Y. The main chamber faces east and is nearly double the dimensions of the side-chamber facing south which measures only 4 ft. 9 in. by 4 ft. 2 in. The front side of the interior of chamber X measures 7 ft., but its far-end side lengthens out to 8 ft. 6 in., the remaining two sides being about 5 ft. 3 in. each. Chamber X is also a little higher than Y, the height of the former being 3 ft. 6 in. and that of the latter 3 ft.

The bench inside X, 8 in. high from the floor, is of irregular width and runs along all sides except where the entrance is situated. The wide pedestal-like base of its central pillar is only an extension of the middle portion of its bench on the western side.

Chamber Y has no central pillar but has a bench, 5 in. high from the floor, its width varying from 1 ft. 6 in. to 1 ft. 9 in., running along its eastern and northern sides. In the south-western corner of the cave and in the middle of its western side are two very crude and irregularly-shaped flat-surfaced blocks of the same height as the bench. The irregular platform may have been used for keeping vessels and other objects. Another alternative—and that seems more likely—is that Y is an unfinished chamber; its builders intended either to shape the existing blocks into vessel-stands or stools or to level them down altogether but had to abandon the operation for some unknown reason. What other purposes these platforms could have served is otherwise difficult to imagine.

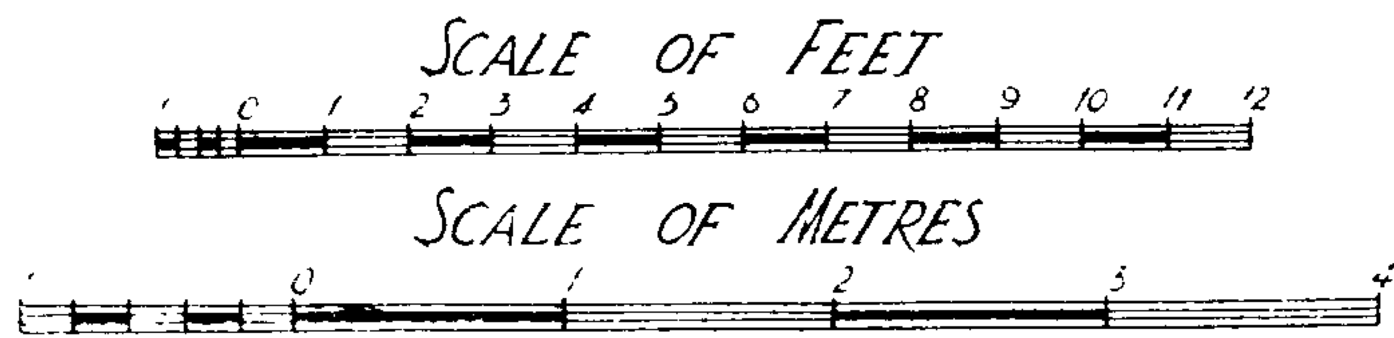
F. Kattakampal

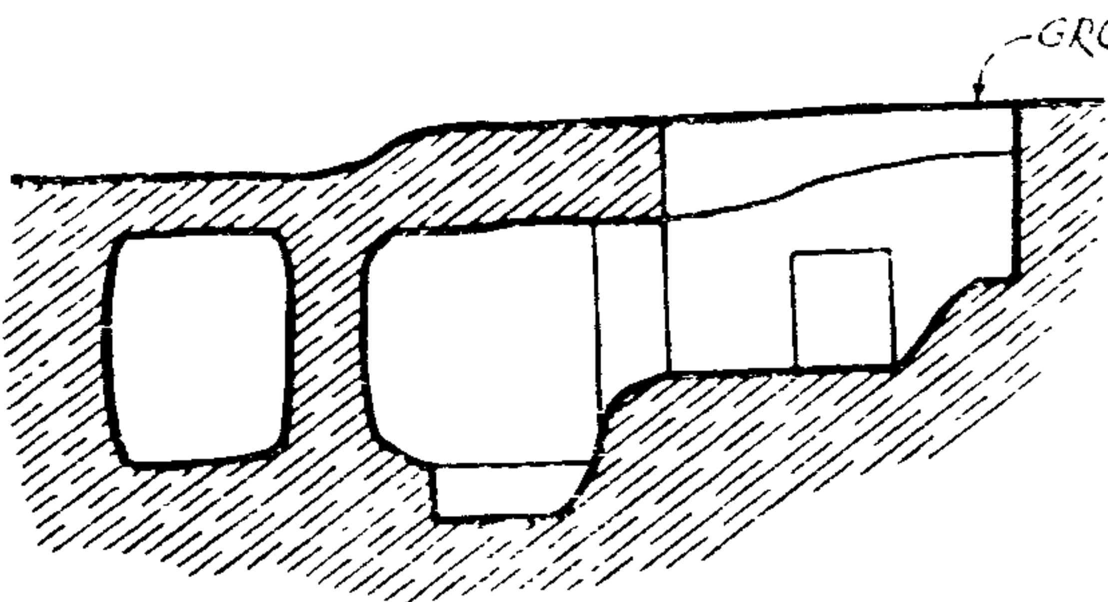
Two furlongs west of Kattakampal, which lies about 5 miles north-west of Kunnamkulam, there is another multi-chambered cave (fig. 8; pl. XLIV B), comprising in all four chambers, X, X′ and Y and Y′.[1] Chambers Y and Y′, situated laterally, face east, while the remaining two chambers, X and X′, situated opposite each other across the outer court, face north and south respectively. Chambers Y′ and X′, on the northern side, are replicas of Y and X respectively on an east-west median line, bisecting the entire composite cave into two halves. It may be observed that the Padinyattamuri four-chambered cave is also built on a corresponding plan.

The chambers are roughly of comparable sizes, the dimensions being: X, 4 ft. 6 in. by 3 ft. 4 in.; X′, 5 ft. 9 in. by 3 ft. 9 in.; Y, 4 ft. 11 in. by 4 ft. 1 in.; and Y′, 4 ft. 11 in.

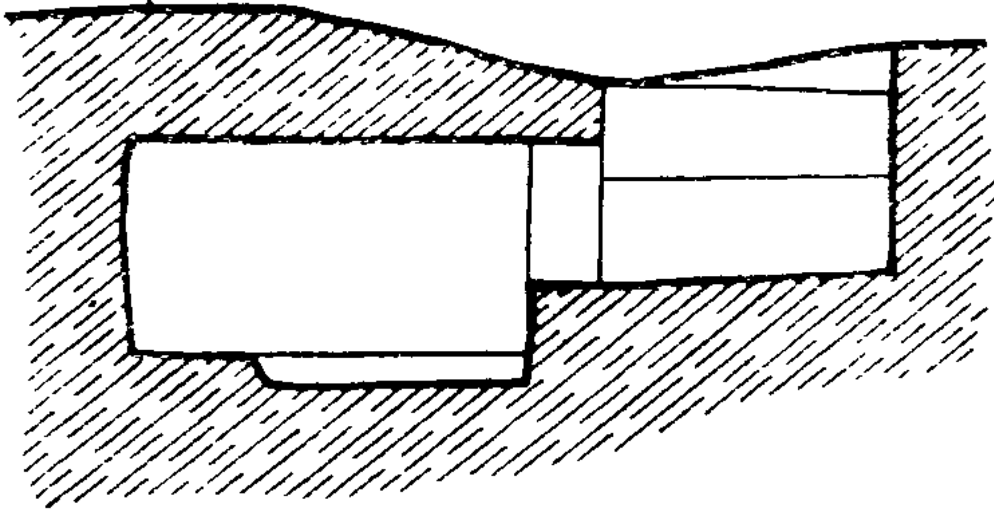
[1] Cf. *An. Rep. Administration Arch. Dept. Cochin State*, 1109 M.E. (1933-34), p. 6 and figs. on pp. i-v.

CAVE AT EYYAL (COCHIN)

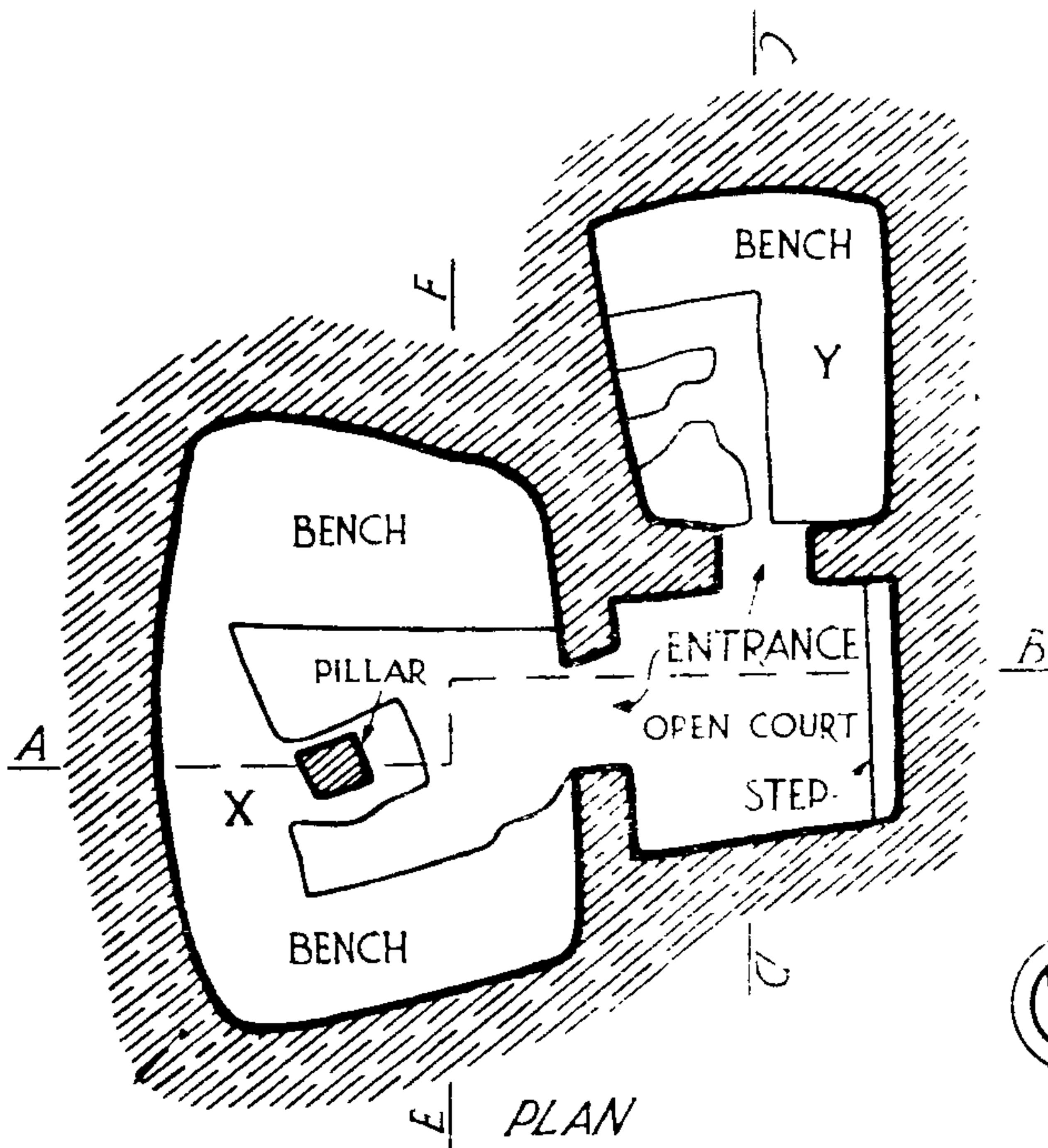




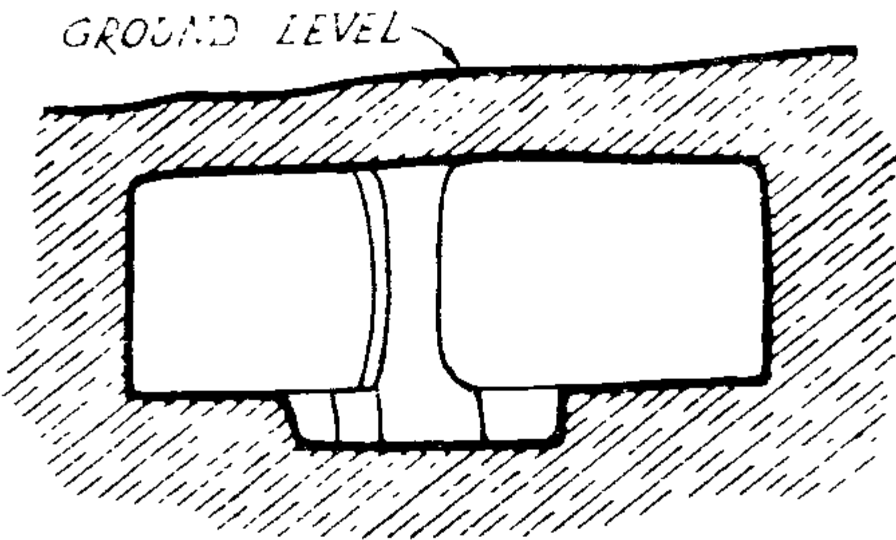
SECTION A-B



SECTION C-D

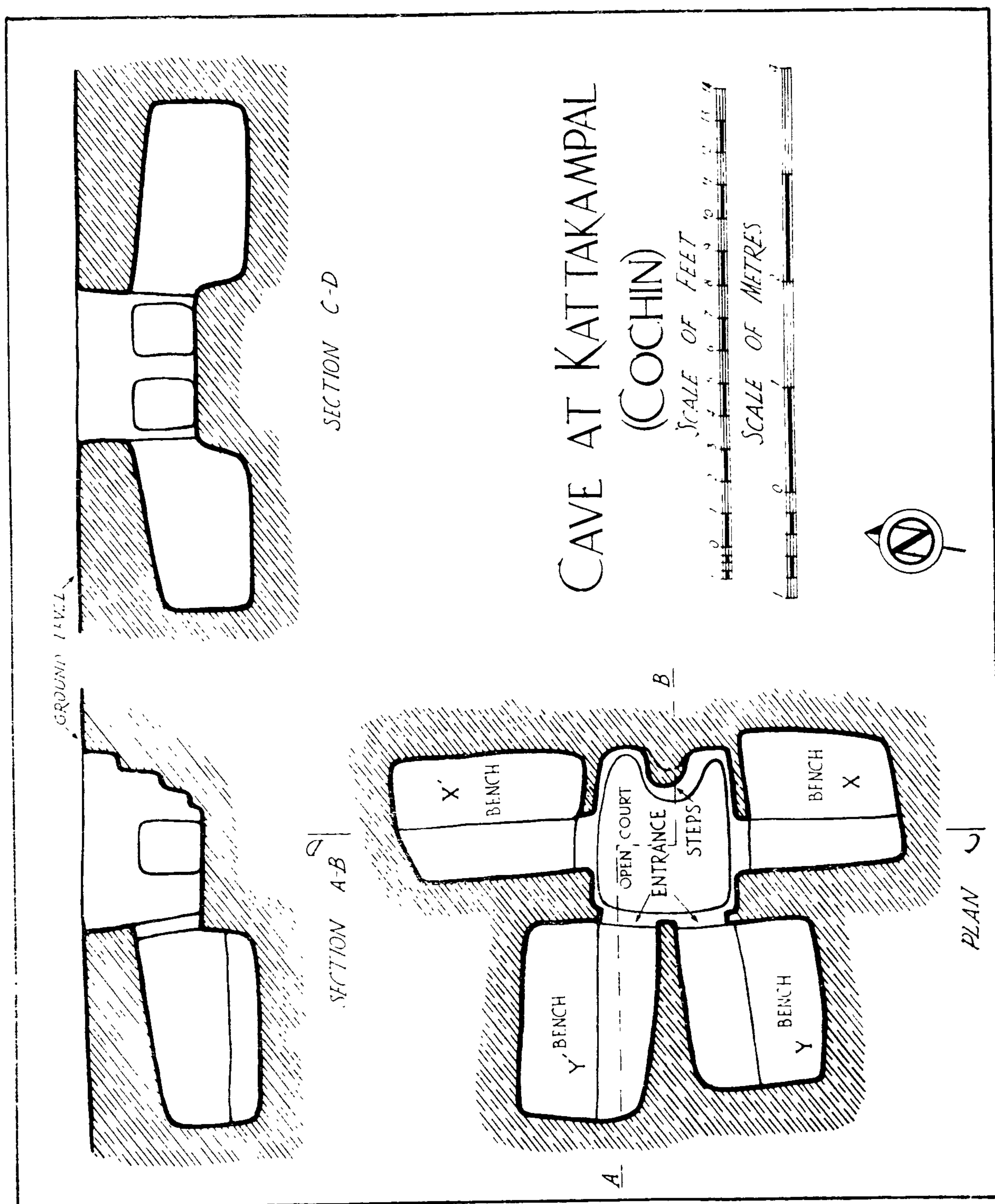






SECTION E-F

FIG. 7



CAVE AT KATTAKAMPAL
(COCHIN)
SCALE OF FEET
SCALE OF METRES
SECTION C-D
SECTION A-B
PLAN
BENCH X'
BENCH X
BENCH Y'
BENCH Y
OPEN COURT
ENTRANCE
STEPS
A
B
C
D

Fig. 8

by 4 ft. Their entrances measure 1 ft. 8 in. in width and 1 ft. 10 in. in height. Along the length of each chamber, on the right-hand side of the entrance in the northern and on the left-hand side in the southern chambers, there is in each chamber a bench, measuring 9 in. in height and 2 ft. $2\frac{1}{2}$ in. on an average in width, except in X, where it is 2 ft. 6 in. wide. The height of the chambers is 3 ft. 3 in.

The Eyyal and Kattakampal caves should be distinguished from the others not only because they are multi-chambered but also because their floors are rectangular and their ceilings horizontal. On general plan, the Padinyattamuri caves investigated by Logan agree with the Kattakampal caves, except that the former contain two benches each (marked by Logan I and J on his plans and distinguished by him from each other as stone beds and benches) and also a central pillar each, leaving aside the so-called fire-places (L on his plan), the exact nature of which is difficult to make out from his plans.

4. CLASSIFICATION OF THE CAVES

It will have been noticed that the Cochin caves described above correspond to some of the Malabar caves mentioned in earlier notices. They cannot, therefore, be treated in isolation, although, among their main features, the existence of vessel-stands in some of them has not been reported earlier. The Padinyattamuri caves may contain low vessel-stands, but we cannot be certain in view of the vague nature of Logan's plans and descriptions. The raised circular structures, clustering in groups of three each by the side of the pillar and marked as fire-places on his plans by Logan, may probably be vessel-stands.

On the basis of a close analysis of the many divergent as well as common characteristics of the Kerala caves, especially of those in Cochin described above, we arrive at the following typological sequence:

(i) caves with a central pillar;
(ii) caves without a central pillar;
(iii) caves with a top-opening; and
(iv) multi-chambered caves.

It may be mentioned that the multi-chambered cave is not an evolution of the cave with top-opening. It represents a development from the single cave, with or without central pillar.

5. ORIGIN OF THE CAVES

A. Vedic origin

In his *Vedic Antiquities*, G. Jouveau-Dubreuil argues for a Vedic origin for the rock-cut caves of Malabar. The Buddhist *stūpa*, in its origin a sepulchral monument, is, he asserts, a reproduction of an earlier hollow Vedic *stūpa*, which originally was probably a domical hut built of bamboo or wooden ribs, imitating the hemispherical wooden hut of an Aryan chief. The laterite-cut caves of Malabar, runs Dubreuil's argument, must be the hollow *stūpa* of Vedic Aryans, for it is hemispherical in shape and even otherwise a perfect imitation of the hut of an Aryan chief.

Certain features of Buddhist caves—notably the jambs sloping inwards as they rise above and the rib-like arches cut in the vaults, if, as in the *chaitya*-caves of western India, the vault was not actually furnished with wooden ribs, and also the façade made of

wood—were rightly taken long ago to be imitations of wooden huts.[1] Among these features Jouveau-Dubreuil also includes the central pillar of the Malabar caves, which, according to him, imitates a wooden pole bearing the vault of a hut.[2] But it appears dubious if the Kerala caves do really possess many essentially wooden characteristics. Jambs, as the term is understood, are absent in them; the recesses of their entrances are cut vertically and are not sloping inwards. In the Buddhist caves, as at Guntupalle,[3] arches ribbed into the vault occur even in the absence of a central pillar. But only a few of the Kerala caves are crowned with arch-shaped shafts radiating from the central pillar and touching the fringes of the vault.[4]

It should be noticed that the central pillar of the Mennapuram cave is frail and slender, such as would not seem to be necessary for the stability of the structure and, therefore, belongs to a stage in the architectural development when the central pillar had become non-functional and merely a stylized and ornamental feature, as its corbelled capital would conclusively confirm. As a rule, the central column of the Cochin caves is quite thick and strong, on an average 1 ft. 6 in. square, and is mainly utilitarian.

Nevertheless, even if the Cochin caves did originate from wooden huts, why must they be taken as imitations of Aryan huts specifically? Why not of Dravidian or pre-Dravidian huts?

It has been suggested by another scholar that 'the nearest parallel which these caves bear to the dwelling houses of the living, is to the hut of the Todas of the Nilgiris, with its domical roof and direct access from the ground outside as in these caves.'[5] There is admittedly a certain resemblance between the arched façades of Toda huts and of Buddhist caves, but this correspondence is not observed in the façades of the Kerala caves. Moreover, the Toda huts are not domical and round as these caves. The vaults are no doubt arched in both cases, but the huts are rectangular on plan. The platforms inside the Toda huts used for keeping belongings have a solid base, whereas those in Kerala caves, with legs cut underneath them, reveal their connexion with similar benches in port-hole cists, as will be seen below (p. 110).

Jouveau-Dubreuil makes much of the rock-cut chambers with top-opening, which feature, according to him, represents a chimney, the entire cave being an *āgnīdhrīya*, i.e., house of the sacred fire for performing Soma- and Agni-sacrifices.[6] Each of the so-called fire-places in the Padinyattamuri caves is, according to him, 'the fire-place where resides a divinity, the domestic fire.'[7] But Dubreuil builds his theory on very insufficient and controversial data. From Logan's plans we get no adequate idea of the exact structure and shape of his so-called fire-place. In the absence of a definite description, it may even be, as has been suggested above, that the feature under reference is no fire-place at all. Certainly no indubitable fire-place has been observed in any other Kerala cave.

[1] Cf. J. Fergusson and J. Burgess, *The Cave Temples of India* (London, 1880), pp. 39 ff.; also Longhurst, *An. Rep. Supdt. Arch. Surv., Southern Circle, Madras*, 1916-17 (1917), pp. 30 f.

[2] *Op. cit.*, pp. 13-15.

[3] Cf. Raghavan, *op. cit.*, p. 386.

[4] Longhurst, *op. cit.*, p. 30 and pl. XVIII. At Guntupalle, the domed vault is only 'ribbed *in imitation* of a wooden structure' (italics mine); its framework is not made of wood, as Jouveau-Dubreuil asserts, *op. cit.*, p. 11.

[5] Raghavan, *op. cit.*, p 388.

[6] Jouveau-Dubreuil,. *op. cit*, pp. 25 ff. The correct word is *āgnīdhrīya*, not *āgnidhriya*, as spelled by him and Aiyappan. Commenting on *Śatapatha Brāhmaṇa*, 6. 6. 4. 15, Harisvāmin explains: *agnīdhra-maṇḍape bhavaḥ āgnīdhriyaḥ*.

[7] *Op. cit.*, p. 19.

And, what is more important, the Padinyattamuri caves, which are the only ones to contain the so-called fire-places, have no top-opening—no chimney to let the smoke escape.

The open court outside the Padinyattamuri caves is, according to Jouveau-Dubreuil, the central assembly-hall where the funeral rites to the dead were performed.[1] But this feature cannot be isolated from similar structures in other Kerala caves. The original open court may have in course of time developed into an assembly-hall in the case of Buddhist *chaitya*-caves. But in the earliest caves of the Kerala coast it was constructed to facilitate the operation of cutting and gaining an easy access into the cave proper. Later on it was discontinued, as in the Panunda caves, where operations could be carried on directly from the slope of the rock. Further, the argument that an *āgnīdhrīya* must have a chimney is based purely on an unwaranted assumption. In fact, the term *āgnīdhrīya* itself has been grossly misunderstood by Jouveau-Dubreuil[2] and his authority, E. B. Havell.

B. Buddhist origin

Local tradition has often ascribed a Buddhist origin to the rock-cut caves described above. They have sometimes been regarded as 'the abodes of hermits who flourished in these parts when Buddhism and Jainism were popular in Kerala.'[3] Some writers, who take Śāstā as a Hinduized Buddha, regard the presence of the remains of Śāstā-worship in the vicinity of some of these caves as an additional evidence for their Buddhist origin.

The caves, cannot, however, be of Buddhist origin. No object found in them has any remote association with the Buddhist form of worship. Structurally, even the simplest of the Buddhist or allied caves, like the Lomas Rishi and Sudāmā caves of the Barabar group cut in the granite, which are the only ones to bear any resemblance to the Kerala caves, are far in advance of the technique attained by the builders of the Kerala caves.

It may also be pointed out here, as shown by V. Narayana Pillai,[4] that Buddhism had a large number of adherents only at certain places; it never became the prevailing religion in Kerala. Śāstā was originally a forest-deity, who was in course of time incorporated into the Hindu pantheon. But there are no adequate grounds to believe that he is the Hinduized Buddha.

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[1] *Ibid.*, pp. 17 f.

[2] In Brāhmaṇa literature, among the various priests for a sacrificial rite is mentioned a priest called *āgnīdhra*. The word *āgnīdhrīya* is an adjective, sometimes used as an adjectival noun, and is derived from *āgnīdhra*, meaning 'anything pertaining to the *āgnīdhra* priest'. In the main, the term *āgnīdhrīya* has been used in the Brāhmaṇa texts to denote the fire or fire-hearth kindled and looked after by the priest *āgnīdhra* or the sacrifice performed by him. Occasionally, it has also been employed with reference to the shed in which the sacred fire under the charge of the *āgnīdhra* was kept. But there is nothing to suggest that the *āgnīdhriya* was a closed tabernacle. It was simply one of the many fire-hearths necessary for a complete sacrifice. Accordingly, if a chimney is considered necessary for an *āgnīdhrīya*, why should it not be so for an *āhavanīya* or *gārhapatya*, which are some of the other fire-hearths mentioned along with *āgnīdhrīya* (cf. *Śatapatha Brāhmaṇa*, 3. 6. 2. 21)? For other reasons which go against Dubreuil's theory, see Aiyappan, *op. cit.*, p. 312; Raghavan, *op. cit.*, pp. 386 f.

[3] Anujan Achan, *An. Rep. Administration Arch. Dept. Cochin State*, 1102 M.E. (1926-27), p. 8. Cf. Aiyappan, *op. cit.*, pp. 300 and 308 f.; L. A. Krishna Iyer, 'The prehistoric archaeology of Kerala', *Modern Review*, March 1946, p. 188.

[4] 'Buddhism in ancient Kerala', *Proc. and Trans. Tenth All-India Oriental Conf., Tirupati* (Madras, 1941), pp. 505 f.

C. Megalithic origin

The kinship of the Kerala rock-cut caves with the megalithic monuments, in structure, orientation and contents, leaves no doubt as to their sepulchral nature, although in subsequent times some of them may occasionally have given shelter to Buddhist or other monks or even to ordinary people.

Among the megalithic monuments of Kerala is the cist-type scooped out in laterite but lined with granitic slabs alongside the hollowed-out quadrangle, with a capstone placed on top.[1] One of these cists, at Porkalam, contains a roughly rectangular port-hole in its eastern orthostat and a bench of granitic slab on its southern interior.[2] At Sulur, in Coimbatore District, a similar grave contained two benches and another also a circular port-hole.[3] The side-benches of the cist, and also its port-hole, which is usually covered with a slab, disclose an unmistakable megalithic origin of these caves, which gets more and more confirmed on a closer scrutiny of their manifold other features.

A general feature of megalithic monuments is a stone circle. Such circles are frequently found on the surface to demarcate the megalithic tombs underground, and they have been observed to encircle also the cists of the type described above, at Tiruvilvamala in Cochin,[4] at Palambalakkodu in Malabar and also at a site in Coimbatore.[5] One of the rock-cut caves discovered by Babington at Bangla Motta Paramba was demarcated by a similar stone circle.[6]

All the Cochin caves described above face east or east-south-east, although some in Malabar have been reported as facing north or north-east;[7] but so do occasionally other megalithic monuments. The predominating orientation, both in the case of megalithic tombs and rock-cut caves, remains east, which is an additional evidence to establish that the two classes of monuments are associated with each other.

What is still more significant from the point of view of the mutual association of the two classes of monuments is the fact that at Porkalam, in an area of roughly 2 acres, *kuḍakallus* (hoodstones), dolmenoid cists, urn-burials covered by granitic slabs and enclosed

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[1] For the megalithic monuments in Cochin and elsewhere in south India, see V. D. Krishnaswami, 'Megalithic types of south India', *Ancient India*, no. 5 (1949), pp. 35 ff.; K. R. Srinivasan and N. R. Banerjee, 'Survey of south Indian megaliths', *ibid.*, no. 9 (1953), pp. 103 ff.

[2] For another type of megalithic monuments at Porkalam, see B. K. Thapar, 'Porkalam 1948: excavation of a megalithic urn-burial', *Ancient India*, no. 8 (1952), pp. 3 ff.

[3] *Man*, XXX, no. 10 (Oct. 1930), pp. 171 f.

[4] K. Govinda Menon, 'Red painted pottery from Cochin State', *Man*, XXXVII, no. 9 (Sept. 1937), pp. 146 ff.

[5] *Man*, XXX, no. 10 (Oct. 1930), p. 171.

[6] Jouveau-Dubreuil regards this stone circle as 'the "Vedikā" which surrounded the sacrificial ground in Vedic rites'. If we were to regard the stone circles as *vedikās*, the entire megalithic culture becomes Vedic. But, in any case, there is no indication in the Vedic literature that the sacrificial rites of Vedic Aryans took place underground, while the *vedikās* demarcated the sites above the ground. Above all, the height of the rock-cut caves of Kerala, which, on an average, is 3 ft., makes it impossible to think that the complicated rites of Vedic ceremonies, requiring frequent and highly-elaborate movements, could be performed in such low tabernacles, where even a short-statured man can hardly move about or stand upright.

[7] Aiyappan, *op. cit.*, pp. 303 f. and 311 f. The entrance of the rock-cut tomb near Calicut described by Longhurst, *op. cit.*, as facing west is not really an entrance: it is an opening made by the quarrying workmen who accidentally came upon the cave. In his *Story of the Stūpa* (Ceylon, 1936), fig. 7, where the plans of the cave have been reproduced, the author has corrected the mistake.

by circles and caves are found existing side by side, each type of monument keeping to its respective place without trespassing into that of the other, as if all of them were broadly contemporaneous and singly part and parcel of one single cultural unit.

If the authors of megalithic monuments belonged originally to granite regions, they adapted their burial-tomb to the new environments after coming to a lateritic zone and made the best of the material available there: for they continued to use granite either for the side-slabs or capstones of cists or even for covering the top-openings of the lateritic caves.[1] Laterite, the native rock of the new region, was extraordinarily amenable to cutting into any shape or form. It was easy, they learnt by experience, to hollow out the inside of a rock into a cave, and thus to ensure better protection for the remains of the dead. It is significant that the cist proper is very rare in the lateritic region of Cochin, as if it made room for the rock-cut cave, although in the granitic regions higher above dolmenoid cists have a dominant distribution.

Unfortunately, the caves of Cochin mentioned above had already been opened or otherwise interfered with when they were examined in 1946. And hence, in most cases, no definite information about their contents could be obtained. However, the pottery from two of the caves, viz. Kattakampal and Eyyal, opened earlier by the State Archaeologist, is preserved in the State Museum at Trichur (pl. XLV); and, although limited in quantity, it is sufficient to elucidate and establish a close and definite relationship of the Cochin caves, first, with those of the adjoining Malabar District, the Kerala caves thus coming all under one category, secondly, with the megalithic tombs in Cochin, represented by hood- and umbrella-stones (*kuḍakallu* and *ṭopikallu*), dolmenoid cists and urn-burials, and, thirdly, with the megalithic monuments of south India as a whole.

Excepting large vessels, almost all pottery recovered from these caves is wheel-turned. While the larger vessels are red, the smaller ones have been burnt by inverted firing under reduced heat in the kiln. Their core is blackish grey and surface burnished black. The available specimens are mostly black, although technically they fall under the Black-and-red Ware class. These characteristics of fabric and finish distinguish the entire range of megalithic pottery in southern India. On the whole, the pottery displays an advanced ceramic craftsmanship.

The four-footed jars of the Eyyal and Kattakampal caves are closely akin to their counterparts recovered from most of the Malabar caves and urn-burials elsewhere. Similar jars were recovered not only from a megalithic cist at Porkalam but also from an urn-burial there.[2] From the cists at Brahmagiri were recovered similar vessels with three legs.[3]

In the Calicut cave examined by Longhurst was an urn with a pointed bottom, exactly like the ones frequently found in the numerous urn-fields. The tall cylindrical bowls of the Eyyal cave and a carinated pot with a wavy-line pattern painted on its shoulder recovered from the Kattakampal cave are also closely related to similar pottery unearthed from the Coimbatore and Tinnevelly sites.[4] In the urn-burial at Porkalam were also found some deep bowls, but they are wider than those under consideration.

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[1] E.g. Aiyappan, *op. cit.*, p. 302.

[2] Thapar, *op. cit.*, fig. 3, *17* and *8*.

[3] R. E. M. Wheeler, 'Brahmagiri and Chandravalli 1947: Megalithic and other Cultures in the Chitaldrug District, Mysore State', *Ancient India*, no. 4 (1947-48), p. 213, *C25* and *C25a*.

[4] Cf., e.g., *An. Rep. Supdt. Arch. Surv., Southern Circle, Madras*, 1910-11 (1911), pp. 12-13; *An. Rep. Arch. Sur. Ind.*, 1911-12 (1915), pp. 158-60, pl. LXXII, 3.

Lids and ring-stands, usually of black ware, are yet another link between the rock-cut caves and the megalithic tombs. The ring-stands from the Eyyal cave have a complete resemblance with those from Padinyattamuri, Perungulam, Feroke and Calicut caves, as also with the Coimbatore and Tinnevelly pottery. Turreted lids, with a flat or round finial, found in the Padinyattamuri, Chelleth and Eyyal caves, are typologically identical with the corresponding pottery from Coimbatore, and so are the flanged vessel-lids and open bowl-like urn-covers. From Kattakampal comes a lid with a ringed finial, a rare type which equates with a similar lid from the Chelleth cave and also with lids from Coimbatore and Tinnevelly Districts. Corresponding lids and stands also occurred in the urn-burial at Porkalam.[1] Some of the lids from Brahmagiri[2] also have a general resemblance with those from Kerala.

Two of the Malabar caves have also yielded small-sized sarcophagi. From Feroke-2 was obtained a sarcophagus, described as a bathtub-like vessel by Aiyappan, 2 ft. long and 1 ft. high, with twelve small legs attached to its bottom. A similar object, described as a tray by Longhurst, measuring 2 ft. 3 in. by 1 ft. 3 in., was discovered from the cave near Calicut. It had eight small legs and was covered by a lid of the same size.

Grinding stones and rollers, obtained from the Perungulam and Panunda caves, closely resembling the ones found in the Adichanallur urn-burials,[3] give further data for a megalithic association of the rock-cut caves.

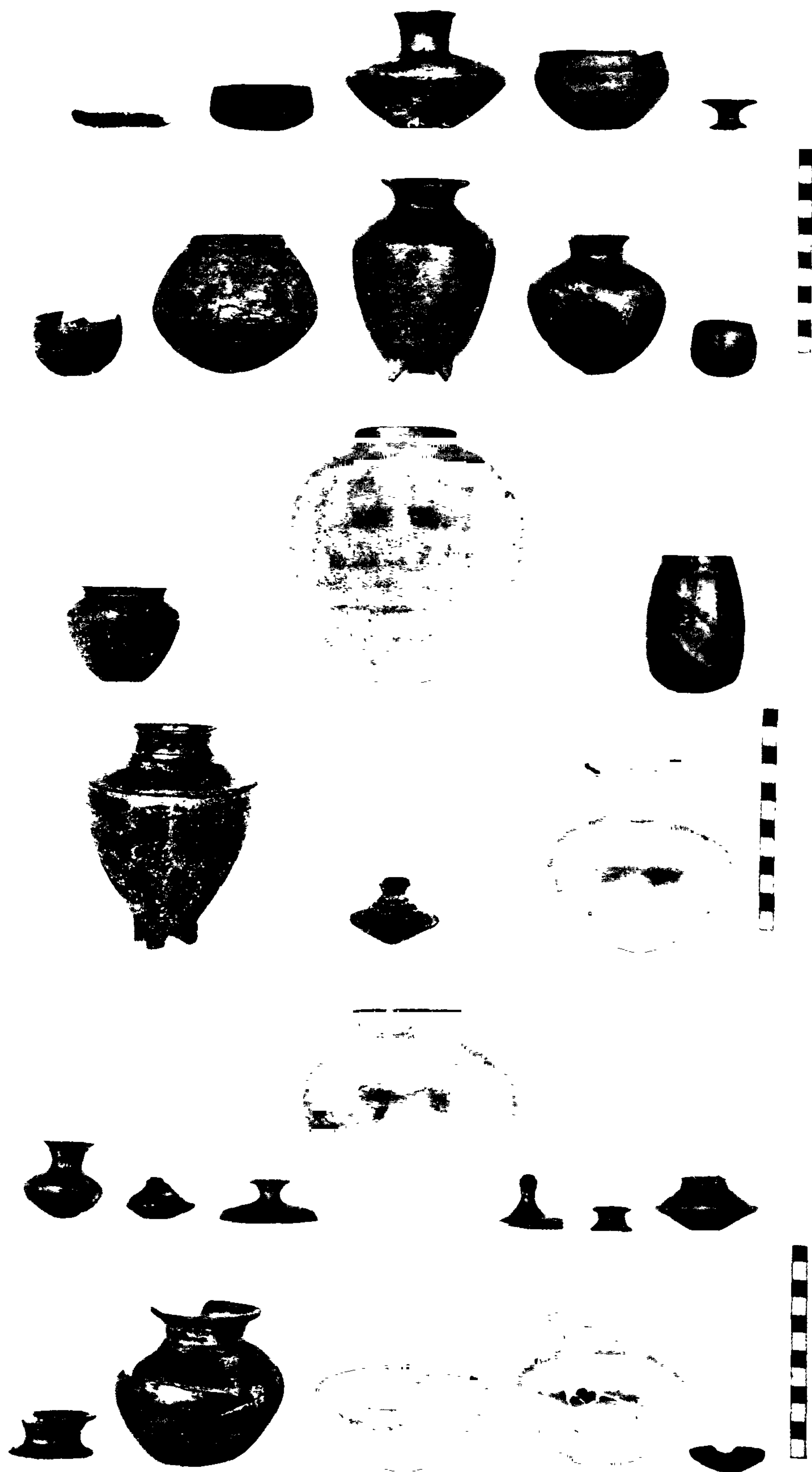
Into the details of other pottery, of various shapes and sizes, it is unnecessary to go. Even a cursory perusal of the characteristic features and fabric of the pottery from the caves and megaliths will easily convince one of the close connexion that exists between the two classes of monuments.

In the preceding paragraphs frequent parallels have been drawn between the pottery from the rock-cut caves and the pottery from the Coimbatore and Tinnevelly sites. The pottery from Coimbatore and Tinnevelly and the pottery from the Cochin megaliths and rock-cut caves fall within the same culture-complex. A strong undercurrent, running beneath the surface-index of the Malabar, Cochin and Coimbatore cultures, affirms their close affinity with each other, in spite of local variations.

The evidence of iron implements obtained from the Kerala caves and megaliths has also an important bearing on the nature of the former. Apart from usual objects like blades, hatchets, swords and billhooks, which are frequently met with both in the caves and megaliths, especially of the Kerala region, there is the evidence of a few more striking objects. Among the iron antiquities of Perungulam, Feroke and Chelleth caves is a tripod, such as was exhumed by Babington from what he described as an umbrella-stone, although, according to the revised nomenclature,[4] we would rather describe it as a hood-stone. From the same monument Babington also recovered a trident (*triśūla*) like the ones found in Parambantalli and Perungulam caves. A similar trident is also reported from a hood-stone at Kattakampal, although the monument has been described as a dolmen.[5] The double hook, found in Padinyattamuri, Perungulam and Feroke-2 caves, although exhibiting slight variations, brings all the rock-cut Kerala caves still mutually closer.

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[1] Thapar, *op. cit.*, fig. 2, *8*, *9* and *14-16*.
[2] Wheeler, *op. cit.*, p. 217, *P2*.
[3] Aiyappan, *op. cit.*, p. 311.
[4] Krishnaswami, *op. cit.*
[5] *An. Rep. Administration Arch. Dept. Cochin State*, 1109 M.E. (1933-34), p. 6.



Pottery from Kattakampal (upper rows) and Eyyal (middle and lower rows), now in Trichur Museum. See page 111

Also, a broken bronze bowl obtained from the Eyyal cave corresponds closely to similar bronze pieces recovered from other Cochin megaliths, including the cist at Tiruvilvamala excavated by Govinda Menon.

Among the finds from hood-stones discovered by Babington are also a few carnelian beads, some of which, of the etched tabular type, correspond to the beads obtained from Feroke-2.[1] Similar beads have also been obtained from the excavated urn-burial at Porkalam.[2]

D. Origin of the domed vault

The domed vault of the rock-cut caves, granting for the sake of argument that it was inspired by the hemispherical wooden hut, cannot be taken to have been constructed in imitation of the huts of the Vedic Aryans. In fact, the domed vault is more probably an imitation of a wooden umbrella. In a region where the rainfall is extraordinarily heavy and umbrella a necessity to protect oneself, a structure like an umbrella may easily have commended itself to the local folk to be employed also in the construction of their tombs, so as to afford better protection to their dead, just as, as suggested by Krishnaswami,[3] the *ṭopikallu* (hat-stone) and *kuḍakallu* (hood-stone) may have had a corresponding origin. If this is so, the ribbed shafts radiating across the vault from the central pillar of a cave are surely an imitation of the curved ribs of an umbrella. Indeed, it is significant that the Guntupalle cave, with its domed vault ribbed in imitation of a wooden structure, was taken by Longhurst as mainly simulating the framework of a wooden umbrella.[4] Imagining the dome of an umbrella as part of the globe, its latitudinal and longitudinal ribs may possibly have transferred themselves as the ribbed arches of the Guntupalle cave.

In his *Story of the Stūpa*, Longhurst has delineated at length the prominent part that umbrella has placed in the origin and evolution of the *stūpa*. Umbrella appears in remote antiquity as an emblem of authority and power, in the mural paintings of ancient Egypt and the bas-reliefs of Assyria. In India, on the Kerala coast, umbrella is closely associated with the funeral cars of certain tribes. Such cars are superimposed with a number of receding canopies one above the other, the top finally culminating in an umbrella. There is ample evidence to show that in Malabar an umbrella was erected on the graves to protect the remains and relics of the dead.

Even if the umbrella-motif in Kerala architecture originated from its symbolic sovereignty, temporal or spiritual, its evolution must have received an impetus from the local climatic conditions. The Kerala country and the Himalayan region are the two territories where the umbrella-motif is strikingly prominent in temple-architecture; and both these regions are subject to heavy and continuous rains.

6. TYPOLOGICAL EVOLUTION OF THE CAVES

The domed ceiling made it easier for the cave-builders to cut a circular or oblong floor. It may be noticed that, as a rule, caves with a horizontal ceiling have also a

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[1] Aiyappan, *op. cit.*, pp. 306-07 and fig. 4. Further connexion between the rock-cut caves and megaliths may probably be established on the basis of pottery-marks, for which see *ibid.*, pp. 307 f.

[2] Thapar, *op. cit.*, pp. 12-16.

[3] Krishnaswami, *op. cit.*, p. 40; also paper entitled 'Prehistoric Cochin', read by him at the Thirtyfourth Indian Science Congress, 1947, Delhi.

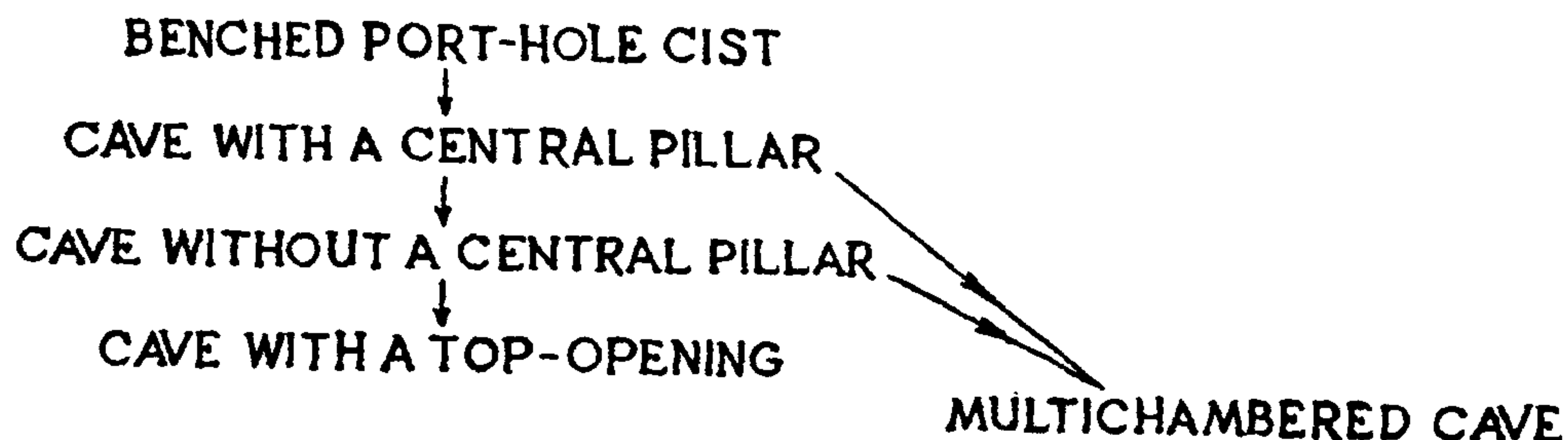
[4] *An. Rep. Supdt. Arch. Surv., Southern Circle, Madras*, 1916-17 (1917), p. 30.

rectangular floor. The central pillar, whether borrowed from the central pole of a hut or from the staff of an umbrella, was considered essential for the durability of the structure. Subsequently, when the plasticity of laterite was thoroughly understood, it was occasionally discarded: it is present only in some of the multi-chambered caves.

The circular opening at the top was probably one of the latest developments in the evolution of the caves. In any case, it is a perplexing feature, for which no satisfactory explanation is yet forthcoming. It has been suggested that 'the object of the whole sepulchre being the careful preservation of the ashes to ensure undisturbed rest to the spirit of the departed, the constructors of the tomb, in all probability, considered it best to narrow down the wide opening of the *kuḍakkallu* or cairn-type of burials to smaller dimensions and to plug it securely.'[1] The top-opening does probably derive from megalithic monuments. But, at the same time, it has perhaps no functional value for the structure and only shows the retention of a stylized megalithic features; tradition, and not utility, must have dictated its continuance in the rock-cut caves of Kerala. A similar reason will also explain the existence of circle-stones around a cave, reference to which has already been made above (p. 110).

The multi-chambered cave represents a natural multiplication of the simple single cave. Such caves may have been intended as family-graves,[2] probably like double dolmens, but this interpretation cannot at present be too emphatically urged.

The possible evolution of the caves is illustrated below:



7. CHRONOLOGY

It is difficult in the present state of our knowledge to assign a calendar-date to the rock-cut caves of Kerala. They clearly belong to the megalithic culture of south India, especially of Kerala. The megalithic cists with port-holes and side-benches, like those at Porkalam and Sulur, might have preceded the construction of rock-cut caves, although the two types of monuments might easily continue to exist side by side in subsequent times.

The unmistakable affiliation of the caves with the megalithic monuments of Kerala in particular and of south India in general has been amply demonstrated above (pp. 110 ff.), and any date ascribed to the former must be in consonance with the accepted date of the latter. During the last decade some evidence has been collected about the dates of the megaliths in different parts of the Deccan and south India, and they can tentatively be placed between two or three centuries before and one century after Christ.[3] There is no indication at present why the Cochin caves should not fall within this time-limit.

[1] Aiyappan, *op. cit.*, p. 312.

[2] Logan in *Indian Antiquary*, VIII (1879), p. 311; Jouveau-Dubreuil, *op. cit.*, p. 17.

[3] Wheeler, *op. cit.*, pp. 180 ff.; Thapar, *op. cit.*, pp. 5 f. The evidence has been summarized in Srinivasan and Banerjee, *op. cit.* [Also above, pp. 32-34.—Ed.].

8. CONCLUSION

The rock-cut caves of Kerala are, then, the burial-tombs of the megalithic people, whose religion comprised belief in the continuance of life for the departed spirit within the tomb. The people buried their dead along with a few necessities of life, as the vessels, grinding stones and rollers and iron implements obtained from them clearly indicate. No complete skeleton has yet been recovered from any cave,[1] but pieces of bones, deposited in a sarcophagus, bowl or urn, have been found in some of them. These tombs are, therefore, examples of what has been called secondary burial and fall within the megalithic culture-complex. But whether the burials in question are exclusively post-exposure or post-cremation cannot at present be ascertained, until fresh caves come to light and a thorough investigation of them is undertaken and completed by competent workers in the field.

[1] In the megalithic grave at Sulur, *Man*, XXX, no. 10 (Oct. 1930), p. 172, the remains of skeletons seem to have been more complete.

TECHNICAL SECTION

BĪDRĪ WARE

By T. R. Gairola

BĪDRĪ ware[1] is the name given to a class of damascened metalware, manufactured chiefly at Bidar in Hyderabad State (17°55′ N. Lat. and 70°32′ E. Long.). Bidar attained celebrity in medieval times under the kings of the Bahmanī dynasty, who shifted their capital to this place in 1424, and later on under the Barīd Shāhīs (1536-1619). The successive rulers of both the dynasties embellished the place with a large number of monuments.

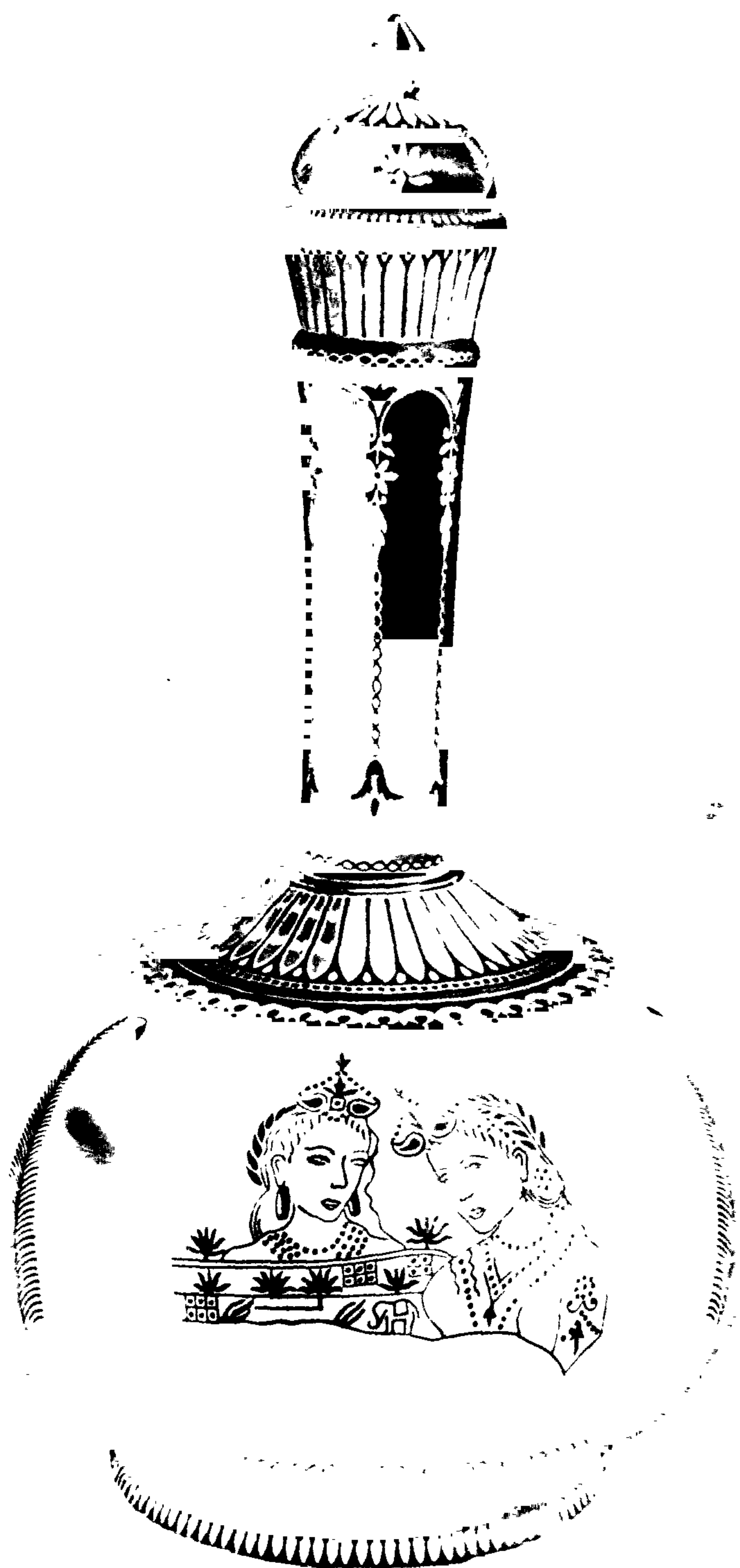
It is likely that the Bīdrī industry originated out of the silver and gold inlay-work on steel practised by the Arabs and Persians, steel being substituted by an alloy in India. While Bidar was, and still is, the principal centre of the industry, it subsequently spread to three other places, viz. Lucknow (U.P.), Purnea (Bihar) and Murshidabad (West Bengal).

The process of the manufacture of the ware generally consists of four stages. The first stage is to prepare a metallic cast from a clay mould by the wax-replacement process and then to smoothen the alloy-surface with a file and sand-paper. The second stage is to give a black colour to the metallic surface by dipping it in copper sulphate solution and then to engrave on it the designs, usually floral. The third stage is to inlay the design with silver, and the last is to impart a permanent black colour to the alloy-surface leaving the brilliant metallic designs unaffected. Though the craft requires a high technical and artistic skill, it has been well-perfected. It was at one time practised on a large scale, and specimens of the ware are found present in all good museums of the country and outside. Writing in 1817, Benjamin Heyne remarked: 'The Hindoos have since time immemorial not only excelled their neighbours in the management of metals for useful and curious purposes, but they are even familiarly acquainted with alloys unknown to our practical chemists. Among those in general use that have drawn the attention of Europeans living in India, are the alloys for the gurry, and the Biddery ware.'[2]

The excellence and beauty of the ware depends upon the contrast which the inlaid metal—silver or gold—presents to the black background of the body of the vessel. The

[1] Apart from the references given below, see G. C. M. Birdwood, *The Industrial Arts of India* (London, 1880), II, pp. 163-64, and *Bidri Ware—an Ancient Art* (Government Cottage Industries, Hyderabad). For the history of Bidar, see G. Yazdani, *Bidar—its History and Monuments* (Oxford, 1947).

[2] Benjamin Heyne, 'An account of Biddery (Vidri) ware in India', *Asiatic Journal*, III (1817), pp. 220-22.



A high-necked jar in Bidrī ware. *See page 117*

To face page 117



A silafchi in Bidri ware. *See page 117*

black background is obtained instantaneously by rubbing a particular earth mixed with ammonium chloride on the fresh surface of the alloy. The blackening effect is lasting. Though, unfortunately, the industry is dwindling fast, the ware has been priced very high and is even now considered an object of excellence in all exhibitions. The belief that the alloy, of which the vessels are made, imparts certain medicinal and curative properties to the water contained in them adds to the value of the ware. The price of individual pieces depends upon the quantity of the precious metals used and the fineness displayed in the execution of the patterns. Pls. XLVI and XLVII respectively illustrate a high-necked jar and *silafchi* in this ware.

The present work was undertaken to determine the composition of the alloy and the materials used in making the ware. Various recipes were given for the manufacture of the alloys used at the four places mentioned above at the times when the respective wares were examined. These are summarized below.

BIDAR.—According to Newbold the composition of the alloy was copper: zinc=1: 16, while according to Smith it was copper : zinc=1 : 4.[1] Heyne examined the alloy and found it to consist of 24 parts of tin and 1 of copper. Wilkins reported subsequently that the ware made at Banaras contained zinc in place of tin along with copper. Yazdani says that the Bīdrī ware is made of metal composed of zinc 83·5 per cent, copper 12 per cent and lead 3 per cent.[2]

PURNEA.—T. N. Mukharji gives the proportion of copper and zinc as 9:176.[3] Earlier, Buchanan-Hamilton gave the composition as copper 460 grains, lead 414 grains and zinc 12,360 grains.[4] But according to Heyne an alloy of 16 oz. of copper, 4 oz. of lead and 2 oz. of tin was mixed with zinc in the proportion of 3 parts of the alloy and 16 parts of zinc.[5] Lead was not reported in the alloy later on.

MURSHIDABAD.—Mukharji reports that tin was a constituent of the alloy, and lead is reported by George Watt to have been entirely omitted.[6]

LUCKNOW.—Besides the usual copper and zinc, steel-powder is reported to have been added to give additional strength to the compound, the proportions being 4 oz. of copper, 4 oz. of steel-powder and 12 oz. of zinc. Watt writes that at Lucknow the chief metal was zinc, the others, viz. lead, tin and copper, being added each in the proportion of 1/16th part of the zinc.

A sample of the alloy-specimen, collected from the market at Hyderabad and reported to represent Bīdrī work, was put to chemical analysis, and the result obtained was as follows: lead=1·65 per cent; copper=3·65 per cent; zinc 92·72 per cent. Both tin and iron were found absent.

The ingredients of the mixture used to impart black colour to the fresh alloy-surface vary in the four different centres of manufacture of the ware, but the principal constituents producing the tint are ammonium chloride (NH_4Cl), saltpetre (KNO_3) and blue vitriol ($CUSO_4$).

The earth used at Bidar to make the surface black after the completion of the inlay-work was also collected and analysed. It gave the following results: water-soluble

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[1] Quoted by T. N. Mukharji, 'Bidri-ware', *Journal of Indian Art*, no. 6 (April 1885), pp. 40-44.
[2] Yazdani, *op. cit.*, p. 20 n.
[3] Mukharji, *op. cit.*
[4] Francis Buchanan, *An Account of the District of Purnea in 1809-10* (Patna, 1928), p. 534.
[5] Quoted by Mukharji, *op. cit.*
[6] George Watt, *Indian Art at Delhi* (Calcutta, 1903), pp. 46-49.

constituents = 14 per cent (nitrate and chloride present but sulphate and ammonia absent). The insoluble portion contains calcium carbonate and sufficient quantity of iron as digested with 6N.HCl.

This earth is collected by the local manufacturers from the bottom of old walls inside the fort of Bidar and is then mixed with ammonium chloride and water and rubbed on the fresh surface of the alloy. The change is almost sudden and is quite lasting. Laboratory-experiments suggest that the blackening of the lustrous surface is effected by ammonium nitrate and ammonium hydroxide or ammonium chloride and also with a mixture of an alkali nitrate and ammonium chloride. In the Bidar earth the active agent for producing the black surface is an alkali nitrate, which, when mixed with excess ammonium chloride and rubbed with water on the alloy, gives the required black tint.[1] The high percentage of oxide of iron and carbonate and chloride of calcium may not be a useless ingredient in the earth so far as its use in blackening the alloy is concerned.

[1] A blackening effect can also be produced with a solution of copper sulphate alone, but it is not so permanent and pleasant in appearance.

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